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VIEWS, NEWS AND INTERVIEWS.

The April issue of the New York *Standard*, a bright journal devoted to the jewelry trade, contains a number of contributions from prominent people on "The Story of My First Watch." The tale of his first time-piece, as told by Thomas A. Edison, is terse and characteristic enough to be reproduced in its entirety. Mr. Edison writes:

"I never carried a watch in my life. I never wanted to know what time it was."

An electric railway mail service, similar to that in successful operation at St. Louis, is contemplated for Cleveland, O.

A native of Troon, on the coast of Ayrshire, Scotland, when the contract for lighting the first three steamers fitted with electric light at the Troon shipyard was completed, formed one of a social party gathered to treat the electricians who had made the installation and otherwise celebrate the event. In a burst of candor and comradeship he was overheard saying to one of the wiremen, "Man, Peter, efter workin' wi' you 'on they boats, I believe I could put in the electric licht mysel', but there's only ane thing that bates me." "Aye, what is that?" said his interested companion, willing to help him if it lay in his power. "It's this, man; I dinna ken hoo you get the lle along the wires!"

The telephone line lately constructed to connect all the principal towns of Clarke County, Wash., with Portland, Ore., crosses the Columbia at La Camas. The connection is made by a No. 12 steel wire suspended over the river. A hole five feet deep was cut in the rocks in the center of the river at this point. A fir mast 80 feet high was firmly cemented therein and further supported by a pyramid of rocks 12 feet high. Tall trees on the Oregon and Washington sides serve as supports at the shore ends. From the mast to the shore is a span of a little more than one-fourth of a mile.

A three seated electric carriage, operated by a two horse-power storage battery, ran down the principal business streets of Chicago last week and startled even Chicagoans.

The Charleston Presbytery, which was in session last week at Columbus, S. C., has suspended Miss Sadie Means from church membership as a discipline for working on Sunday. Miss Means is an orphan girl and is employed in the Columbus telephone exchange, where her duties require her to be at work for four hours on Sunday. The New York *Recorder* explains the thing this way:

The telephone girl was expelled from the church
Not so much for working on Sunday
As because, when the old thing gave a lurch,
It said "Hell-o," backward, one day!

An Important Bell Telephone Patent.

FULL TEXT OF ALEXANDER GRAHAM BELL'S RECEIVER PATENT, GRANTED JANUARY 30, 1877.

We present herewith a copy of letters patent No. 186,787, issued to Alexander Graham Bell, January 30, 1877, which is likely to cut an important figure in the next

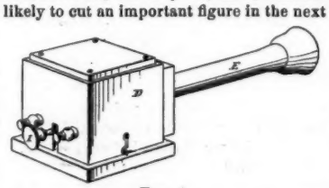


FIG. 1.

ten months. It is probable that many inventors who are now looking with longing eyes toward the telephone industry are losing sight of this patent. The basic Bell Telephone patent, and the one upon which most of the suits were brought, has already expired. It will be seen that this patent covers

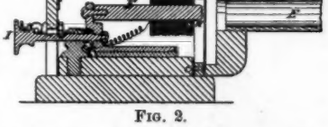


FIG. 2.

the Bell receiver in pretty broad terms, the third claim, for instance, covering a magnet combined with a plate of iron or steel or other inductive material which can be thrown into vibration, and also a magnet having a coil upon the end of its pole near-

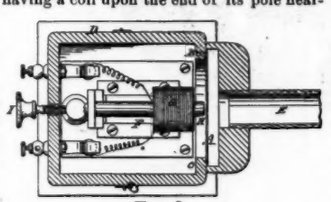


FIG. 3.

est the diaphragm. Whether or not these broad claims will meet with the successful fate that attended the basic claims of the patent which has expired, it is difficult to say; but inventors who are proposing to introduce individual lines should bear in mind that these claims are contained in a patent which is yet alive. The patent is given in full below:

In letters patent granted to me on the 6th day of April, 1875, No. 161,789, and in an application for letters patent of the United States now pending, I have described a method of an apparatus for producing musical tones by the action of a rapidly interrupted electrical current, whereby a number of telegraphic signals can be sent simultaneously along a single circuit.

In another application for letters patent now pending in the United States Patent Office I have described a method of, and apparatus for, inducing an intermittent current of electricity upon a line wire, whereby musical tones can be produced, and a number of telegraphic signals be sent simultaneously over the same circuit, in either or both directions, and in letters patent granted to me March 7, 1876, No. 174,465, I have shown and described a method of an apparatus for producing musical tones

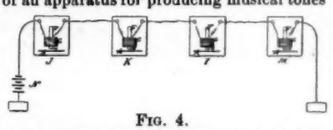


FIG. 4.

by the action of undulatory currents of electricity, whereby a number of telegraphic signals can be sent simultaneously over the same circuit, in either or in both directions, and a single battery be used for the whole circuit.

In the applications and patents above referred to, signals are transmitted simultaneously along a single wire by the employment of transmitting instruments, each of which occasions a succession of electrical impulses differing in rate from the others, and are received without confusion by means of receiving instruments, each tuned to a pitch at which it will be put in vibration to produce its fundamental note by one only of the transmitting instruments. A separate instrument is therefore employed for every pitch, each instrument being capable of transmitting or receiving but a single note, and thus as many separate in-

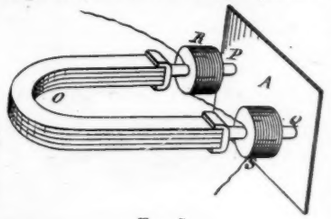


FIG. 5.

struments are required as there are messages or musical notes to be transmitted.

My invention has for its object, first, the transmission simultaneously of two or more musical notes or telegraphic signals along a single wire in either or both directions, and with a single battery for the whole circuit without the use of as many instruments as there are musical notes or telegraphic signals to be transmitted; second, the electrical transmission by the same means of articu-

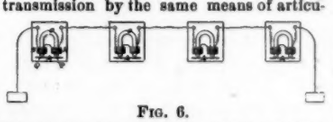


FIG. 6.

late speech and sounds of every kind, whether musical or not; third, the electrical transmission of musical notes, articulate speech, or sound of every kind without the necessity of using a voltaic battery.

In my patent No. 174,465, dated March 7, 1876, I have shown as one form of transmitting instrument a stretched membrane, to which the armature of an electro-magnet is attached, whereby motion can be imparted to the armature by the human voice, or by means of a musical instrument, or by sounds produced in any way.

In accordance with my present invention I substitute for the membrane and armature shown in the transmitting and receiving instrument alluded to above, a plate of iron or steel capable of being thrown into vibration by sounds made in its neighborhood.

The nature of my invention and the manner in which the same is or may be carried into effect will be understood by reference to the accompanying drawings, in which Fig. 1 is a perspective view of one form of my electric telephone; Fig. 2 is a vertical section of the same; Fig. 3 is a plan view of the apparatus, and Fig. 4 is a diagram illustrating the arrangement upon circuit.

A in said drawings represents a plate of iron or steel, which is fastened at B and C to the cover or sounding box D. E represents a speaking tube, by which sounds may be conveyed to or from the plate A. F is a bar of soft iron. G is a coil of insulated copper wire placed around the extremity of the end H of the bar F. I is an adjusting screw, whereby the distance of the end H from the plate A may be regulated.

The electric telephones J, K, L and M are placed at different stations upon a line, and are arranged upon circuit with a battery, N, as shown in diagram, Fig. 4.

I have shown the apparatus in one of its simplest forms, it being well understood that the same may be varied in arrangement, combination, general construction and form, as well as material of which the several parts are composed.

The operation and use of the instruments are as follows:

I would promise by saying that this instrument is and may be used both as a transmitter and as a receiver—that is to say, the sounder of the message will use an instrument in every particular identical in construction and operation with that employed by the receiver, so that the same instrument can be used alternately as a receiver and a transmitter.

In order to transmit a telegraphic message by means of these instruments, it is only necessary for the operator at a telephone, (say J), to make a musical sound, in any way, in the neighborhood of the plate A—for convenience of operation through the speaking tube E—and to let the duration of the sound signify the dot or dash of the Morse alphabet, and for the operator, who receives his message, say at M, to listen to his telephone, preferably through the speaking tube E. When two or more musical signals are being transmitted over the same circuit all the telephones reproduce the signals for all the messages; but as the signals for each message differ in pitch from those for the other messages, it is easy for an operator to fix his attention upon one message and ignore the others.

When a large number of dispatches are being simultaneously transmitted, it will be advisable for the operator to listen to his telephone through a resonator, which will re-enforce to his ear the signals which he desires to observe. In this way he is enabled to direct his attention to the signals for any given message without being distracted or disturbed by the signals for any other messages that may be passing over the line at the time. The musical signals, if preferred, can be automatically received by means of a resonator, one end of which is closed by a membrane, which vibrates only when the end with which the resonator is in unison is emitted by the receiving telephone. The vibrations of the membrane may be made to operate a circuit-breaking, which will actuate a Morse sounder or a telegraphic recording or registering apparatus.

One form of vibratory circuit-breaker which may be used for this purpose I have described in letters patent No. 178,399,

June 6, 1876. Hence, by this plan the simultaneous transmission of a number of telegraphic messages over a single circuit in the same or in both directions, with a single main battery for the whole circuit and a single telephone at each station, is rendered practicable. This is of great advantage in this, that, for the conveyance of several messages, or signals or sounds over a single wire simultaneously, it is no longer necessary to have separate instruments correspondingly tuned for each given sound, which plan requires nice adjustment of the corresponding instruments, while the present improvement admits of a single instrument at each station; or, if for convenience, several are employed, they all are alike in construction, and need not be adjusted or tuned to particular pitches.

Whatever sound is made in the neighborhood of any telephone, say at J, Fig. 4, is echoed in *fac simile* by the telephones of all the other stations upon the circuit; hence, this plan is also adapted for the use of the transmitting intelligibly the exact sounds of articulate speech. To convey an articulate message it is only necessary for an operator to speak in the neighborhood of his telephone, preferably through the tube E, and for another operator at a distant station upon the same circuit to listen to the telephone at that station. If two persons speak simultaneously in the neighborhood of the same or different telephones, the utterances of the two speakers are reproduced on the same circuit; hence, by this plan, a number of vocal messages may be transmitted simultaneously on the same circuit, in either or both directions.

All the effects noted above may be produced by the same instruments without a battery, by rendering the control bar F H permanently magnetic. Another form of telephone for use without a battery is shown in Fig. 5, in which I is a compound magnet, to the poles of which are affixed pole-pieces of soft iron P Q, surrounded by helices or insulated wire R S.

Fig. 6 illustrates the arrangement upon circuits of similar instruments to that shown in Fig. 5.

In lieu of the plate A in above figures, iron or steel reeds of definite pitch may be placed in front of the electromagnet O, and in connection with a series of such instruments of different pitches an arrangement upon circuit may be employed similar to that shown in my patent No. 174,465, and illustrated in Fig. 6 of sheet 2 in said patent. The battery, of course, may be omitted.

This invention is not limited to the use of iron or steel, but includes within its scope any material capable of inductive action.

The essential feature of the invention consists in the armature of the receiving instrument being vibrated by the varying attraction of the electromagnet, so as to vibrate the air in the vicinity thereof in the same manner as the air is vibrated at the other end by the production of sound. It is, therefore, by no means necessary or essential that the transmitting instrument should be of the same construction as the receiving instrument. Any instrument receiving and transmitting the impression of agitated air may be used as the transmitter, although for convenience and for reciprocal communication, I prefer to use like instruments as either end of an electrical wire. I have heretofore described and exhibited such other means of transmitting sound, as will be seen by reference to the proceedings of the American Academy of Arts and Sciences, volume xii.

For convenience, I prefer to apply to each instrument a call bell. This may be arranged so as to ring, first, when the main circuit is opened, second, when the bar F comes into contact with the plate A. The first is done to call attention; the second indicates when it is necessary to readjust the magnet, for it is important that the distance of the magnet from the plate should be as little as possible without, however, being in contact. I have also found that the electrical undulations produced upon the main line by the vibration of the plate A are intensified by placing the coil G at the end of the bar F, nearest the plate A, and not extending it beyond the middle or thereabout.

CLAIMS.

1. The unison upon and by means of an electric circuit of two or more instruments, constructed for operation substantially as herein shown and described, so that, if motion of any kind or form be produced in any way in the armature of any one of the said instruments, the armatures of all the other instruments upon the same circuit will be moved in like manner and form, and if such motion be produced in the former by sound, like sound will be produced by the motion of the latter.

2. In a system of electric telephony or telegraphy, consisting of transmitting and receiving instruments united upon an electric circuit, the production in the armature of each receiving instrument of any given motion, by subjecting said armature to an attraction varying in intensity, however such variation may be produced in the magnet, and, hence, I claim the production of any given sound or sounds from the armature of the receiving instrument by subjecting said armature to an attraction varying in intensity, in such manner as to throw the armature into that form of vibration that characterizes the given sound or sounds.

3. The combination, with an electro-magnet, of a plate of iron, or steel, or other material capable of inductive action, which can be thrown into vibration by the movement of surrounding air, or by the attraction of a magnet.

4. In combination with a plate and electro-magnet, as before claimed, the means herein described, or other mechanical equivalents, of adjusting the relative position of the two, so that, without touching, they may be set as closely together as possible.

5. The formation, in an electric telephone, such as herein shown and described, of a magnet with a coil upon the end or ends of the magnet nearest the plate.

6. The combination, with an electric telephone, such as described, of a sounding box, substantially as herein shown and set forth.

7. In combination with an electric telephone, as herein described, the employment of a speaking or hearing tube, conveying sound to or from the telephone, substantially as set forth.

8. In a system of electric telephony, the combination of a permanent magnet with a plate of iron or steel, or other material capable of inductive action, with coils upon the end or ends of said magnet nearest the plate, substantially as set forth.

The Case Automatic High Speed Engine.

The J. T. Case Engine Company, of New Britain, Conn., manufacture the engines illustrated on this page. The Case automatic high speed engine is built in sizes from 2½ to 25 horse-power, and its makers claim for it simplicity, direct action, compactness, lightness of moving parts, large wearing surfaces, automatic lubrication and perfect regulation. The company manufactures three main varieties, all embodying the same principles, viz: The pedestal engine, which may be bolted to a substantial floor or to a foundation; the bracket engine, Fig. 1, to be fastened directly on the wall where floor space is difficult to obtain; and the hanger engine, Fig. 2 (a novelty originated and manufactured by this company), to be bolted to an overhead beam; also sundry varieties for special kinds of work, such as driving fans and exhausters, hoisting elevators, etc. The Case engine has long past the experimental stage. It is widely known and employed probably for a greater diversity of application than any other steam motor.

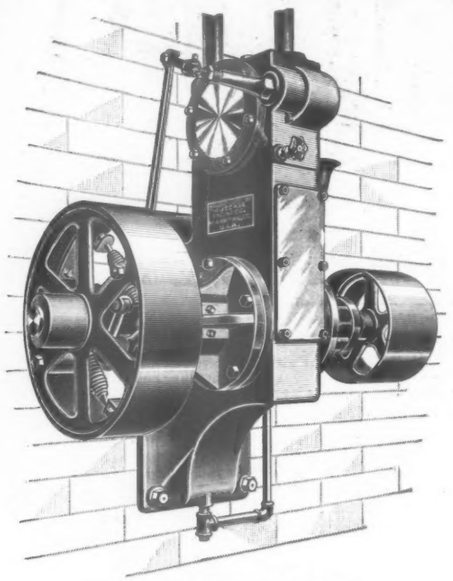


FIG. 1.—THE CASE BRACKET ENGINE.

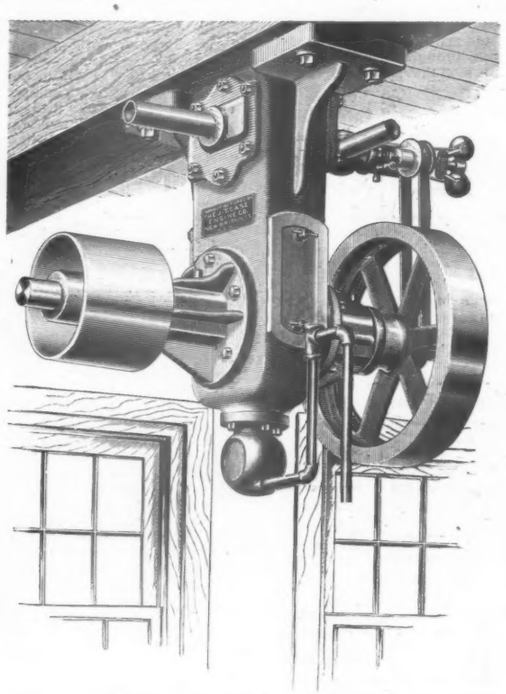


FIG. 2.—THE CASE HANGER ENGINE.

The piston is connected directly to the crank-pin without the intervention of a connecting-rod, thus eliminating at the outset the cross-head, guides and wrist-pin, as found in the ordinary steam engine. This type of construction permits the adoption of fewest working parts and these of lightest weight, resulting in the attainment of high speed without injurious vibration; at the same time the increased speed reduces the necessary size of cylinder, while the elimination of connecting-rod materially diminishes the height of engine. Simplicity and compactness are thus obtained.

The piston, connected thus at one end to the crank-pin direct, travels back and forth at its other extremity through the bore of the cylinder; the latter, by reason of its shape, is free to turn in its casing and is, therefore, rocked by the vibrating piston rod through an arc sufficient to open and close steam and exhaust ports on its face.

The perfect steam balancing of the cylinder permits this rocking motion without friction, and, therefore, with the expenditure of an inappreciable amount of power.

A long sleeve screwed into and forming an integral part of the cylinder, and through which the piston rod works, imparts the rocking motion to the cylinder.

The upper end of the cylinder is open, so that steam admitted for the downward stroke acts from the head of the piston to the face of the surrounding casing or steam chest, and there is consequently no steam thrust that would tend to cause friction of the cylinder against the casing.

The lower end of the cylinder is closed, but the same thing is accomplished for the upward stroke by the admission (through passages leading from the ports) of a thin film or layer of steam to a small balancing chamber of equal area with the piston, hollowed out in the bottom of the cylinder. By this ingenious patented method no power is required to rock the cylinder, it being perfectly steam balanced and frictionless.

This rocking motion of the cylinder is slight (only twice the width of the port), and because of the perfect steam balance, the wear is almost nothing. Should wear occur, however, from long use, it is readily taken up by two taper keys which expand the cylinder the amount necessary to make it tight.

The casing surrounding the cylinder is chambered out, and being constantly filled with live steam, an efficient jacket for the cylinder is formed, and an equal degree of expansion given to the head and cylinder.

The most extreme requirements as to regulation are met by the Case engine, the governor differing from the common type of shaft cut-off governors, inasmuch as it does not diminish the throw of the valve and so throttle the steam on light loads, but has always the same amount of travel, the regulation being effected by its rotating the eccentric on the shaft, and thus giving the valve the right amount of lead over the crank.

It is well known that a high speed engine offers the best opportunities for close regulation, and the Case governor is so sensitive that for widely varying loads no change in speed is noticeable.

The cut-off valve is of the plug type, perfectly balanced, and made with a slight taper so that it can always be kept tight. Its only duty is to define the point of cut-off, the admission, release and exhaust closure being controlled by the rocking of the cylinder, which forms a valve action.

The engine is self-contained and symmetrical. Its frame encloses and completely protects the principal moving parts from dirt and mechanical injury, affording also facilities for the most simple and efficient means of automatic lubrication.

The lower half of the case forms a reservoir for oil and water, into which the crank-pin dips at each revolution. The lubricant is conveyed to the bearings at every stroke automatically by pockets in the crank-discs; after the oil has done its work on the bearings it returns to the case again by gravitation. Any excess, which would naturally work out on the shaft, is thrown off by centrifugal action from ring wipers, and returned by a separate passage to the case; thus the same lubricant is used over and over again. The oil and water finds its way through small openings to a settling chamber below the reservoir, and, being away from the churning action of the crank, the oil separates from the water and returns to the upper case. A stand pipe is connected with the bottom of the settling chamber, and consequently the overflow itself is always water. The cylinder is lubricated by an efficient sight feed oiler, furnished with each engine, to be connected to the steam pipe.

Access to the interior of the engine may be had from either side, by turning two hand screws and removing the plates.

The crank-pin is unusually large, and the main bearings of ample diameter and long for the power developed, presenting large wearing surfaces which, together with perfect lubrication, obviates danger of heating.

Early History of the Manufacture of the Goebel Lamp.

REMINISCENCES OF HENRY GOEBEL AND HIS WORK—HIS MERCURY PUMP AND FILAMENT CUTTER ILLUSTRATED AND DESCRIBED.

BY C. F. DUNDERDALE.

In 1878, at the time that the sub-division of the electric current was occupying the attention of a few electricians who were experimenting with a view of making a practical incandescent electric lamp for commercial lighting purposes, there resided at 489 Grand street, New York, where also his

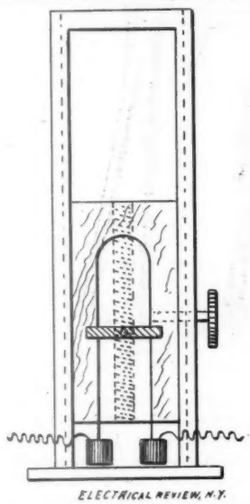


FIG. 1.—GOEBEL'S FILAMENT CUTTER.

watchmaker's repair and jewelry shop was located, Henry Goebel, the inventor of the bamboo filament incandescent lamp. The front store contained a small stock of jewelry and an assortment of inventions in the line of mathematical, optical and astronomical, the product of the brain and skill of Goebel. In the rear his family lived, and in the room between the shop and living apartments was Goebel's workshop. Here he had a large, round, sheet iron heating stove, a square nickel box for baking filaments, an improved form of Sprengel mercury air pump, a set of carbon plates fitting into said box and grooved out to receive bamboo filaments bent in horseshoe form, a device for cutting off carbonized filaments at set resistances, a home-made galvanometer and a set of zinc carbon batteries for furnishing a current. In this workshop he made at his leisure incandescent electric lamps from a bamboo filament from selected growths of bamboo cane, which were sliced down to the required thickness of $\frac{14}{1000}$ of an inch, in a device made to do this accurately; then these slips were put in another device which cut them down to $\frac{13}{1000}$ of an inch the other way, and also made a wide end at the heels. This was done to enable them to be secured to a wire flattened out to receive them. And in order to secure the horseshoe form while being baked, he took plates a quarter of an inch thick, and about six by eight inches square; these he grooved out to receive the raw bamboo filaments and give them the horseshoe form. These plates after being filled with the bamboo slips, they holding about a dozen each, were put in the nickel box, and covered with stove polish graphite, some six plates being piled one on the other to fill the box. The cover was then luted on with clay and the box put in the cylinder stove, and heated to a red heat for an hour or two, then taken out and covered with sand, to cool off slowly. On being removed, they were carbonized bamboo filaments, the counterpart of what were subsequently in the market in a well known incandescent lamp. He got bulbs blown by a glass blower for his use, and after attaching the filaments to a wire, with a flat clasp, something like that used on hoop skirts, and, using a paste made from opium carbonized to cement the filaments to the wire, inserted and sealed them in the glass globes, and mounted the glass bulbs in clusters on a tube and attached the tube to his mercury pump, and produced the vacuum, using his battery to heat the filaments at the same time to assist in expelling the air.

The pump was made from a series of glass bulbs and tubes, mounted on a tall wooden frame, that was made to swing like a clock pendulum to assist in producing a complete vacuum. The mercury was contained in the original iron flask in which it came, having holes bored in the bottom, in which iron pipe nipples were screwed, to which a rubber pipe was attached, and this flask was hoisted and lowered by a small windlass to cause the mercury to rise and fall, and thus do the pumping.

Referring to Fig. 2, *a* is a cluster of lamps; *b*, a cork covered by mercury; *c*, a bulb containing phosphoric acid; *d*, a bulb containing mercury; *e*, a poppet valve of rubber; *f*, a rubber tube connecting with the iron mercury flask *g*, which was raised and lowered by a hand winch; *h*, a swinging board centered at *i* on a pin and moved sideways by the lever *k*, arranged with a clamp to hold it in position; *l*, a box to guide the tongue of the swinging board *n*.

Finding that it was difficult to get his lamps to burn alike, Goebel constructed a device in which the filament was placed with the ends dipping in mercury cups, which cups were the terminals of the battery circuit, and as the filaments were raised or lowered that part above the mercury varied in its resistance. To this device he attached a

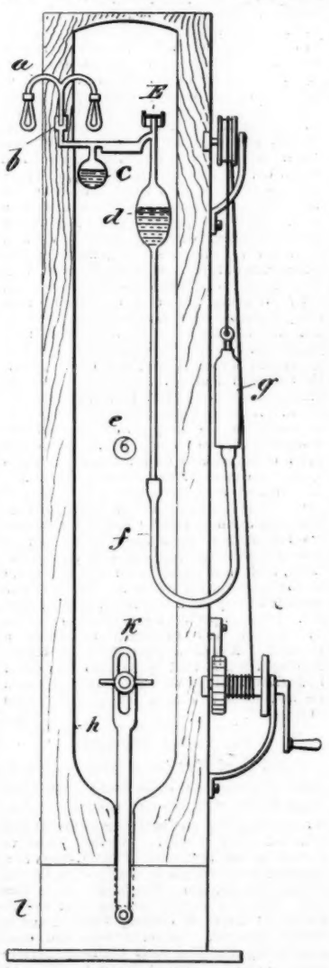


FIG. 2.—GOEBEL'S MERCURY AIR PUMP.

small knife blade, by means of which he was enabled to cut off the filaments at any fixed resistance desired, as shown by his home-made galvanometer. In this way he got his lamps all alike as to voltage.

Goebel's financial resources being very limited, he was unable to make any great or elaborate experiments. And moving among a class of people who could not appreciate the importance of his discoveries, little was heard as to them in the channels where such inventions were sought, so Goebel contented himself with showing them to his friends as scientific curiosities.

About this time a man called on him and stated that he had heard of his lamps and wanted to know about them. Goebel showed them with pride, as he did to every inquirer. This man then asked Goebel how much he would charge to teach him how to make them. Goebel thought it worth $80, which his visitor agreed to pay, and came next day and began his instructions. After mastering the method, he struck a bargain with Goebel to let him bring six men to his shop and have them taught also. This Goebel valued at $1,000, which his visitor agreed to pay, and brought his men there and spent nearly six months making lamps until they were experts thereat. Shortly after leaving, the great sub-division of the electric incandescent light was announced to the public and a large company formed to exploit the invention, and as Professor Moses G. Farmer had perfected a constant potential dynamo, the commercial exploitation of incandescent lighting was soon in a fair way of being a financial success. Goebel remained in obscurity with his invention in his little shop in Grand street, no one interested in the new great discovery caring to bring him out to the front, and when the news reached him of the great achievements that had been made in a financial way with the incandescent lamp, he began to think how he had labored and taught others, and was quite forgotten in the grand celebration of the great discovery. But his lot was cast among the lowly, and there he remained unknown, all these years, quite in ignorance of what was being done in the electrical field, in which he had been so indefatigable as a pioneer discoverer of a rich lead.

The writer well remembers, early in the eighties, of visiting his shop and examining the different instruments and apparatus used by Goebel in his early experiments in making his lamps, as well as samples of lamps made by him originally, which he had preserved as curiosities; also of seeing the above mentioned articles, and having used them in making other forms of lamps, and having made working drawings of some of them. If Goebel had been able to secure the necessary financial and business backing requisite to put his invention on the market, the introduction of the incandescent lamp would have been brought to public notice earlier than it was, and have changed the status of the present situation. He told the writer at the time mentioned that he could produce witnesses that were cognizant of his early production of the lamp if called on to do so, and the fact of his existence remaining in obscurity is a surprise to the writer, who has mentioned it to several interested parties during the last ten years, who it should have been expected would have brought the matter to light in the several patent suits that have been brought in the courts in the matter of the priority of invention.

ELECTRIC LIGHT FLASHES.

Little Valley, N. Y., is agitating the subject of electric lights.

The electric light question will be submitted to the citizens of Geneseo, N. Y., on April 24.

The common council of Medford, Mass., have voted that an electric lighting plant be obtained for the city.

The Bangor, Pa., Electric Light Company has disposed of its plant, franchise, etc., to Milton Flory, of that place, who will erect a new building and make other improvements.

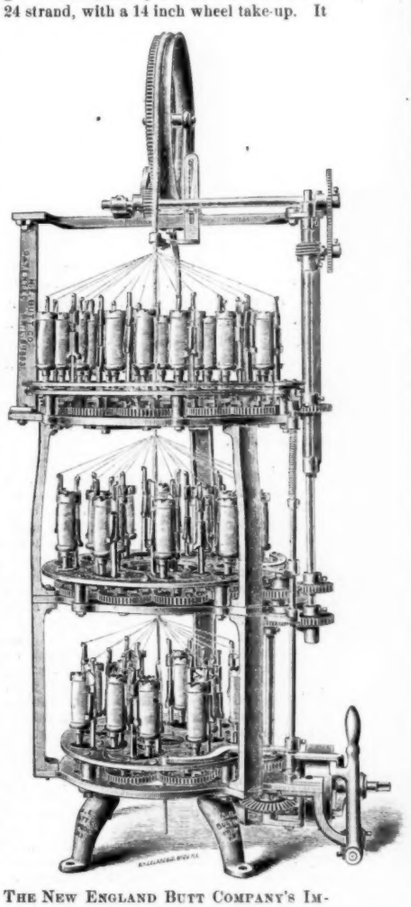
The New Jersey Traction Company expects to replace the burned cars of the Orange line in short order. Negotiations are now under way for the purchase of a number of cars already completed, as it would cause too much delay to wait until new cars could be built.

Reports from York, Pa., state that the Edison and Westinghouse electric light companies, of that city, are indulging in a rate war. The Westinghouse Company started their plant about a month ago, immediately after which the Edison Company reduced their rates. The Westinghouse people last week made a cut and offer arc lights at $1 per month for all night service. The former price was $8 per month.

The Mount Morris Electric Light Company sued the Horse and Cattle Show Association for $1,900 for electric light furnished during the exhibition of the Association on Manhattan Field last year. The suit was brought in the City Court before Judge Newburger. The Horse Show Association declared that the light was too poor for the purpose required, and refused to pay the bill. The electric light company received a verdict of $2,102.55 last week.

A Large Gear Braider.

The illustration on this page shows the latest product in braiding machinery for covering telephone and other electric wires put forth by the New England Butt Company, of Providence, R. I. This is a large gear braider, in triple form, 16 and 20 and 24 strand, with a 14 inch wheel take-up. It



THE NEW ENGLAND BUTT COMPANY'S IMPROVED TRIPLE BRAIDING MACHINE.

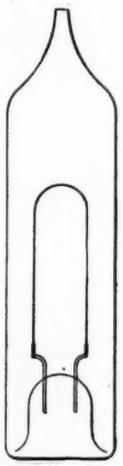
is a newly patented design of braider, and is made in the following combinations: 12 and 16 and 20 strand, 12 and 16 and 24 strand, 16 and 16 and 16 strand, 16 and 20 and 24 strand, 16 and 24 and 24 strand, 24 and 28 and 36 strand. These machines can be supplied with iron scored rolls, if desired.

The New England Butt Company stands easily at the head of companies manufacturing wire braiding machinery, and its excellent facilities enable it to meet the exacting requirements of the makers of insulated wire in a most satisfactory manner. Braiding and cable covering machines made by this concern may be found in every first-class wire covering factory in this country. Many of these machines are made after special designs and for the performance of special work which could not be economically turned out without them.

THE COLUMBIA LAMP CASE.

The suit of the Edison Electric Light Company against the Columbia Incandescent Lamp Company was tried at St. Louis from Tuesday to Friday of last week before Judge Moses Hallett, of the United States Circuit Court, for the Eastern District of Missouri. The arguments were finished on Friday, when Judge Hallett took the case under advisement and announced from the bench that he expected to render a decision within a week.

Arguments for the complainant were made by Messrs. Seward, Dyer and Fish. Arguments for the defendant were made by



DR. MAYER, LAMP NO. 11.

Messrs. Witter and W. H. Kenyon. Both plaintiff and defendant had retained local counsel in St. Louis. The defendant submitted 222 affidavits and the complainant about 120. Among the exhibits were six lamps, three of the meat-saw type and three of the hair-pin type. Three of these six lamps were identified as being made prior to 1879. Among the affidavits submitted by the defendant were the following, which are abstracts:

Henry Goebel's affidavit is in German. The principal points he makes are that he was shown two lamps, marked, respectively, "J. C. Goebel, lamp No. 9, and Dr. Wm. J. Mayer, lamp No. 11"; recognizes lamp No. 9 as of his own manufacture; believes it to be an original lamp made long before 1879; recognizes the glass work, the carbon, the carbon work and every detail; made and used many lamps like this before 1879; would know it anywhere and at any time. The small shoulder was blown in the glass intentionally, so that the lamp could be readily mounted in a plaster of paris socket; generally mounted these lamps in this way; generally used on his telescope wagon lamps like No. 9, and similar ones about his house; placed one over his daughter's sewing machine for her evening work; she was a dressmaker. Recognizes also the carbon and the carbon mounting of lamp No. 11 as his own; also the shape of the glass work and the sucking in of the glass at the lower end of the tube as like that which he did in the early seventies and again in the early eighties; does not know whether or not he made this lamp as a whole; is quite sure that he made the carbon and the mounting; these lamps were not as good as the type represented by lamp No. 9, and he never made very many of them.

George K. Clark, a New Haven, Conn., machinist, has known John C. Goebel for 10 years; seven or eight years ago he told deponent that his (Goebel's) father had made incandescent lamps many years before; deponent expressed to him a desire to have one of these lamps; shortly afterwards Goebel gave deponent two long, slim tubular lamps like the one marked "J. C. Goebel, lamp No. 9"; never saw such a lamp at any other time in his life; within two or three months after deponent mounted one of these lamps in a pine block with plaster of paris; the wires which went through the glass were very small and looked like platinum; connected this lamp in multiple on the arc light circuit; noticed it give a first rate light when one of the carbons in the arc series drew a long arc, but very feeble when the carbons were all burning; had a variable resistance in the shunt circuit with the lamp, and a safety fuse to protect the lamp from excess of current; this lamp was set up and run in this manner at the Bigelow Company's works in New Haven, where deponent then was and still is working; it was run for six weeks or two months, most of the time when the arc lights were burning, but more as a curiosity than anything else; the glass globe was finally broken, as deponent thinks, by the shrinking of the base; does not know what became of the lamp after that, nor what became of the other lamp; had it around the house for a long time, and then it disappeared; has searched for it, but has not been able to find it.

Another New Haven machinist, William Bigelow, employed by the Bigelow Company, at New Haven, remembers that six or seven years ago George K. Clark, an employé of the company, brought to the factory a small incandescent lamp in the form of a tube or cylinder; it was just like exhibit lamp No. 9, except that thinks the glass tube was larger in diameter; helped Clark fix this lamp in a block of wood with copper wires attached, and hung it up in the tool room of the factory in the arc circuit; has read Clark's affidavit and his statement is correct as to way lamp was mounted and run; tried it in the arc circuit to see what it would do; after running six weeks or two months it broke; remember this distinctly, because when it broke it made a loud report; remember that something struck it; Mr. Clark was not there at the time; remember picking up the pieces and putting them on a shelf in the tool room; the lamp varied in brilliancy from time to time, according to the burning of the arc lamps, just as Clark has described it in his affidavit; this trial was made six or seven years ago; the arc lamps referred to were used in the factory to furnish light.

George W. Bigelow, acting engineer for the Bigelow Company, of New Haven, has known John C. Goebel ever since he was employed at the wire works in that city. About six years ago George K. Clark spoke to deponent about some incandescent electric lamps that he said had been made by Goebel's father; deponent's son, William, and Clark soon after fixed up an incandescent lamp in the arc circuit at the works of the Bigelow Company; they experimented with it for some weeks; thinks it was lamp shown to deponent marked "No. 9"; the enclosing glass was in the form of a cylinder, and not pear-shaped; deponent got the impression, either from Clark or Goebel, that Goebel's father was among the earliest experimenters in this branch of electricity.

J. C. GOEBEL, LAMP NO. 9.

Albert H. Clark deposes that he is a son of George K. Clark; remembers that his father had a lamp like No. 9 in his bureau drawers when he lived in Prospect street, which was more than six years ago; in the same drawer was kept an ordinary pear-shaped lamp: is familiar with electrical goods; the shape of the carbon filament in the lamp his father had was that of a hair-pin, as in exhibit lamp No. 9; as near as deponent can remember of about the same thickness; does not know where the lamp is now.

John C. Goebel deposes that lamp marked "J. C. Goebel, lamp No. 9" was given to him by his mother, with at least two others, before May 2, 1879, and has been in his possession ever since. The others are lost. No. 9 was always where he could put his hand upon it until a year and a half ago, when his daughter took to her home the trunk in which they were kept. He had frequently showed them to friends and explained that his father had made them before Mr. Edison had invented his lamp. At one time—in 1881, he thought—he put one of these lamps on the first dynamo set up at the New Haven Wire Mills. The lamp gave a very bright light and did not break, but burned satisfactorily. No. 9 is now, he says, in precisely the same condition as when his mother gave it to him. Lamp No. 4 being shown him, he said he could not tell whether or not he had seen it before, as there was no way of distinguishing it from others in his father's possession. Did not realize the importance of looking up the lamp now known as No. 9, although he had been asked by Mr. Bull to do so, until he read that the judge had criticised the case because only one "hairpin" lamp had been found. Remembers hearing his father say during 1881 or 1882 that a Mr. Bohm, who was working for the American company, came to his shop only to steal information, and that his father cautioned the family not to let Mr. Bohm see anything. Indeed, his father was of a very suspicious nature, often imagined that people familiar with the art to which his inventions related were trying to steal them, and to such persons he could not be persuaded to speak of his work. In a supplementary affidavit John C. Goebel says that on March 2, 1893, Mr. George K. Clark had reminded him that he had given to him (Clark) two tubular "hairpin" lamps. This fact Goebel had forgotten, but now distinctly remembers the circumstance. This is what became of the other two lamps given him by his mother in 1878. He is now positive that these lamps were given him within at least a week of June 3, 1878, when his naturalization papers were made out, in view of his intended visit to Germany, which was afterward given up.

Dr. William Mayer, a dentist, of 1024 Chapel street, New Haven, Conn., said he had known Henry Goebel eight or nine years, and had often visited him at his store on Grand street, New York city. About 1885 Goebel had given him one of his old incandescent lamps and had talked of his work. Deponent understood from his conversation that the lamp given him, and also many others, were made years before and prior to the making of incandescent lamps by any one else. This lamp is marked No. 11. Goebel also gave him a pear-shaped lamp at the same time as the other. Before that time John C. Goebel had told him that his father had made incandescent lamps before Edison or any one else had made them, and that he had used some of them on the wagon upon which his telescope was mounted away back before the war. Lamp No. 11 was in perfect condition when given by Goebel, and originally contained a vacuum. About a year later it broke. During his first visit to Goebel the latter had shown him a vacuum pump and said he had used it a long time. The pump looked old.

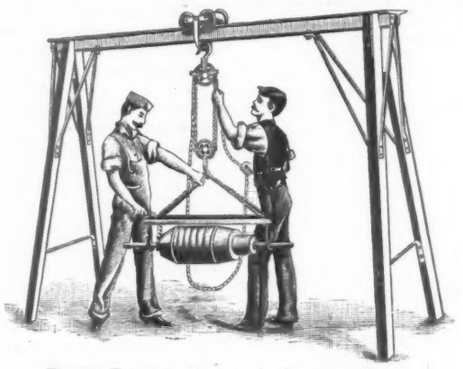
The Taylor Building.

The first of May has a large bearing on many concerns, as it is the time of year when leases expire and changes generally occur. Suggestions for business homes are at this time decidedly in order. We take pleasure in calling the attention of our friends to a business home which is destined to be one of the most popular office buildings in this city. The new Taylor building at 39 and 41 Cortlandt street, is entirely finished and is doing business. Concerns who are contemplating changing their business quarters would do well to inspect the possibilities of the Taylor building, which is one of the most complete business buildings in this city. Its location is central and the view of the bay from the upper stories is superb. The well known Crocker-Wheeler Electric Company and the Wheeler Condenser and Engineering Company have chosen this building for their new business home.

The Connecticut legislature has passed the resolution allowing the Windsor Locks Electric Light Company to issue $30,000 bonds.

Electricity in Art and Literature.

Electricity in other forms than the telegraph is now made part of plot and scene in modern novels. Electric light also is taking its place in art—the artistic light long adopted by artists begins to be seen in their pictures. In novels, Justin McCarthy's story of "The Dictator," now running in the young and evergreen Westminster *Gazette*, makes quite a point of the electric light in Sir Rupert's country house, where the explosion occurs. The glass globes are shattered, the light goes out, but the engineer in charge comes early on the scene to put matters right. Electrical engineers are



BROWN ELECTRIC COMPANY'S PORTABLE CRANE.

getting into novels—in small parts as yet. Soon they will take the place of the wonted canal building hero. Dr. Conan Doyle tried his hand at introducing electricity in a short story a while ago, but if the truth be told, he made a sad hash of Ohm's law and electrostatics; the advertisers' tag, "Electricity is life," seems to have been his idea—an extra strong shock made the villian death-proof. We know some—well, not villains, but engineers—who, on this count might live to the millennium. Frank Stockton, we hear, is writing an electric novel in the *Electric Spark*, a paper that aims at being more popular and amusing even than the *Lightning* of this side the water. Edison's novel has not "come off," as the racing men say—he has found his time too much taken up in discovering how to generate electricity from heat. In art, we see electric light shines in Mr. Solomon's picture which is to adorn the Royal Academy this year. A very high class dinner party is the subject of the picture, and a striking feature is its illumination by electric light. Even Shakespeare is now dragged in to point a moral on transmission of power. The motto of Professor Forbes, of Niagara, at the recent convention, was understood to be: "Oh, what a fall was there, my countrymen!" This may be badinage, but it illustrates the signs of the times—the influence of electricity is everywhere.—*London Electrical Engineer.*

The New York Edison Company Increases Its Capital.

The Edison Electric Illuminating Company, of New York, on April 14, filed with the Secretary of State a certificate showing that it had increased its capital stock from $6,500,000 to $10,000,000. It is stated that the amount of capital paid in is $6,500,000, and that the whole amount of the debts and liabilities of the corporation is $3,500,000. The certificate is signed by the chairman and secretary of the stockholders' meeting; George Foster Peabody and Sherburne B. Eaton, respectively.

A Good Thing for Electric Light Stations.

The Brown Electric Company, Boston, Mass., have just put on the market one of the most serviceable adjuncts of the electric light station and power house, and one which will undoubtedly have a large sale. It is a portable crane with roller attachments, with which armatures and fields can be easily and safely handled. This crane is 12 feet long and eight feet high, strongly built and will last a life time, with proper care. Superintendents should investigate the labor-saving device.

A Dangerous Discovery.

[*From Frank Leslie's Weekly.*]

A well-meaning Englishman has been making electrical experiments to show that writing on the clouds is possible. Unfortunately for the world, he has been successful in his efforts, and he is now said to be perfecting an apparatus which shall place the clouds within the reach of all for this purpose. It does seem as if the authorities would be justified in incarcerating this experimental person for the balance of his days, compelling him to carry the secret of his discovery to his grave. Certainly, if the picturesqueness of nature is to be maintained, something of this sort should be done. It is bad enough to have our beautiful rocky crags decorated with advice as to the best nostrum to be used to cure influenza, and to have the simplicity of rural architecture destroyed by glaring allusions to tonics and hair dyes, without placing the heavens themselves at the mercy of the advertising fiend.

If one chooses to think upon the possibilities arising from the invention in question, one cannot but see how dreadful the future must be for the lovers of cloud effects if the apparatus comes into general use. It is easy to imagine how one of the superb sunsets on the Hudson could be destroyed by having a cloud flit fitfully across the setting orb inscribed with such a legend, for instance, as "If this sun were held in place by Barker's A. A. A. Glue, she'd never set;" while higher up in the blue two larger clouds were announcing to a watching world that "Garahan's Hats are the only hats to wear," and that "*Hawkins's Home Gazette* for April will contain a poem by Anne Warrington Witherup." Worse still, this same Miss Witherup might, from the proceeds of her poem, manage to acquire one of these machines herself, and so inflict her quatrains and sonnets upon a hundred square miles of territory at once. Obscure and impecunious joke writers would be found also using clouds instead of pads upon which to write their lucubrations; stories which conscientious editors keep from the public eye could, and no doubt would, be rescued from oblivion in this fashion; but most dreadful of all complications would be the inevitable use of the clouds for the conveying of messages of affection from engaged young men to their fiancées. When one reflects upon the substance of the average love-letter, and realizes that all this stuff could be dashed off on a cloud to delight one beating heart and sicken a million others, the enormity of the inventor's offense becomes so apparent as to be appalling.

Of course, if the government could regulate the cloud-writing business, some of these distressing consequences might be avoided. If important news could be distributed or messages of necessity be delivered by this use of the clouds, to the exclusion of all petty uses thereof, the invention might even prove a blessing. It cannot be denied that news is in a sense public property, but, like much other public property, is available for those only who can pay for it. If clouds could be made to take the place of newspapers, a great many people who never hear any news because they cannot afford the luxury of a newspaper would get in reality what they have a right to. Then, again, a man detained down-town unexpectedly could scribble off a message on a convenient cloud that happened to be drifting in the direction of his far-distant home, which his wife could not fail to see, thereby saving expense and wear and tear on the telegraph operator's nerves. For ships at sea, too, the invention might prove a blessing if used within proper limits. It rarely happens that a vessel on the broad ocean goes for 24 hours without encountering enough clouds to write a serial story on, and in this way a pleasant interchange of courtesies between those at home and those on the deep could be kept up.

The chief danger of the invention lies in its prostitution to ignoble uses, and unless something can be done to obviate this danger, all civilized nations should frown upon it and its ingenious discoverer.

ELECTRIC RAILWAY AND POWER NOTES.

An electric railway will probably be built between Atami and Odawara, Japan.

Surveyors are at work running lines for new electric railroad from Ellicott City to Clarkesville, Md.

The People's Traction Company, of Philadelphia, will, it is reported, spend $300,000 in equipping their lines with the trolley system.

The State Electric Company, of Clinton, Ia., will probably have cars in operation on their line in Manufacturers' Valley within two weeks.

The General Electric Company, of Boston, has purchased a lot in Birmingham, Ala., and will erect electric works worth $400,000 on Powell avenue and Nineteenth street.

The excavations for the Riverside extension of the Citizens' electric line of Muncie, Ind., have been completed from the fair grounds to the High street bridge. Some 50 men are at work on the extension.

The electric railroad connecting McKeesport, Pa., with Wilmerding, N. J., is to be in operation within 60 days. It will afford a short line to the main line of the Pennsylvania Railroad for those who desire to go East.

The Thomson-Houston Electric Company held its annual meeting at Middletown, Conn., on April 10, and the following directors were elected: H. A. Pevear, C. A. Coffin, J. N. Smith, B. F. Spinney, S. A. Barton and C. H. Newhall, all of Lynn; T. Jefferson Coolidge, Jr., E. E. Griffin and S. E. Peabody, of Boston.

The application for a franchise for the Nassau Electric Railroad Company, of Brooklyn, was heard by the railroad committee of the Brooklyn board of aldermen. The routes asked for are substantially the same as those for which the Kings County Electric Road, as the Nassau was formerly called, applied some time ago.

The West End Street Railway Company, of Boston, is now relaying the track on Boylston street from Arlington street to the Boston and Albany bridge, which was put down four years ago. The grade of the street will be lowered six inches and the heavy Johnston rail, such as are in use on Washington street, will replace the Longstreet rail, but it will not have the welded chairs.

There was a hearing last week before the Brooklyn Commissioners of Electrical Subways in the matter of the application of the Atlantic Avenue Railroad Company to lay its feed wires in First street, from the power house at Third avenue to its car lines in Fifth, Seventh and Ninth avenues. Property owners protested against invasion of their rights in the street. They have secured an injunction preventing the company from building its proposed conduit, and a bill is before the legislature to prevent the company from occupying the street at all. The commissioners decided to withhold any action until the courts have decided the case.

THE RHODE ISLAND TOOL COMPANY'S WORLD'S FAIR EXHIBIT.

A special town meeting of the residents of North Attleboro, Mass., will be called to act on the betterment act, and to provide for the appropriation of $50,000 voted at the annual meeting for the establishment of an electric plant.

The contract for building the new Rockland and Abington Electric Road, at Rockland, Mass., has been awarded to F. H. Cowin & Company, of Boston. Work will begin at once, and will be pushed rapidly forward to completion.

An ordinance will be introduced in the Baltimore city council at its next meeting providing for a tax of $2 on each electric light, telephone and telegraph pole, and on each trolley pole which carries wires other than those in use by the railway.

The Thomson-Houston Electric Company has filed a replevin suit for $100,000 in the Superior Court against the San Francisco and San Mateo Electric Railroad Company, to replevin the dynamo used by the railroad company. Bonds have been filed for $200,000.

A verdict for $3,200 was returned last week for Carl Billguist, of Orange, N. J., by the jury in his suit against the Newark Passenger Company. Billguist, a New York business man, wanted $15,000 for damages to his carriage in a collision with an electric car.

The rapid transit commission met at the residence of Mr. Steinway in Gramercy Park, New York. There were present Commissioners Steinway, Starin, Inman and Bushe. Mr. Steinway said at the opening of the meeting that he had received two important letters in regard to rapid transit, and, inasmuch as he thought the scheme proposed advisable, he would give them to the board for consideration. The letters were both from A. B. Wilson & Company, bankers, brokers and commission merchants at 33 Wall street. They strongly urge the adoption of the underground system as the best means of affording proper rapid transit for the city. The organization of a company with a capital of $15,000,000 for the building of the plant is suggested; and the city is to loan its credit to the company to the extent of 70 per cent. of the actual cost.

TELEPHONE CHAT.

London has 60,000 telephones.

The New England Telephone and Telegraph Company is about to extend its service to Houlton, Me., putting in a local service.

An effort is being made to induce the New England Telephone and Telegraph Company to string a metallic circuit from Rutland to Bellows Falls, Vt.

The American Telephone and Telegraph Company has issued a card to World's Fair exhibitors calling attention to the long distance telephone facilities available for their use. Uniform rates of discount are offered to those who desire to make extensive use of the service.

Thomas E. McSherry, of Baltimore, agent of the Chesapeake and Potomac Telephone Company, was again arrested last week, this time on a warrant sworn out by W. Stewart Polk, which charges him with demanding and receiving more than the legal rate for the rental of a telephone.

Last week the Telephone Mutual Benefit Association, composed of employés of the Southern New England Telephone Company, was organized in New Haven, Conn. The Association will pay to members a sick benefit of $10 a week and $1,000 in case of death. Only employés of the company will be members, and the organization is open to all in the State.

It is stated that there is now a movement on foot to build a large factory for the manufacture of the Shaver telephone at McKeesport which was the first city to adopt the new system after the expiration of the Bell original patent. Since then many other places have organized companies, and the demand is far ahead of the capacity. It is impossible to furnish even a small proportion of the orders, and something must be done to increase the output.

At the beginning of the present year the 20,000th subscriber was connected to the Berlin Telephone Exchange. The system came in operation on April 1, 1882, with 50 subscribers; by the end of the same year this figure had increased to 458. The following are the totals for the January of each year since:

1883.....1,069	1888..... 6,955
1884.....1,625	1889..... 9,199
1885.....2,412	1890.....11,854
1886.....4,324	1891.....14,490
1887.....5,507	1892.....17,013
1893..... 20,000	

Rhode Island Tool Company's World's Fair Exhibit.

The Rhode Island Tool Company, of Providence, R.I., undoubtedly stands among the first producers of high grade bolts, nuts and all kinds of drop forgings. Their splendidly equipped plant is especially designed for the accurate and careful manufacture of these goods. They can make anything and everything in the nut and bolt line that can possibly be required, and turn out nothing but the highest grade work.

A tastefully arranged case of the Rhode Island Tool Company's samples has been prepared for exhibition at the World's Fair and will be sent to Chicago this week, where it will be set up under the direction of Mr. W. C. Dart, who is prominently connected with the company. While this exhibit is not remarkable for its size or extent, it exemplifies in a neat and striking manner the accurate work required by the electrical manufacturer from the kindred interests. The case will be mounted on a platform surrounded by a brass railing, and will be located in the northeast corner of Section P of the Manufactures and Liberal Arts Building.

The Rhode Island Tool Company is well known to many of our large electrical manufacturing companies, as it makes a specialty of the production of first-class finished bolts, studs, cap screws and general screw work for electrical apparatus, besides having facilities for making any class of drop forged work. They carry a large stock of eye bolts, especially for dynamos and motors, and can furnish drop forged members for any regular sized nut at short notice.

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Ohio evidently appreciates the trolley better than any other State in the Union. There are more miles of electric railway representing a greater amount of capital invested in Ohio than in any other portion of the country. These roads are used for freight and passenger traffic, as United States mail routes, and for carrying people from cities and towns to summer and pleasure resorts. Roads are now contemplated and in course of construction by which connections can be made so that one may travel from the eastern to the western boundaries of the State. Great is Ohio! Great in men, manners, methods and electrical progress!

We find the following in the foreign news of the New York *Sun*:

Letter boxes have been attached to the street cars in Huddersfield, England, and letters can be posted in these boxes as the cars are traversing the suburbs, the boxes being emptied by the post-office employés on the arrival of the car at or near the central post-office on each trip. If a person stops the car especially for the purpose of mailing a letter, a penny is collected by the conductor and deposited in the fare box. This doubles the cost of sending the letter, but the advantage of an immediate special delivery is secured, and letters are greatly expedited by the scheme. The scheme is yet an experiment, but it is largely approved.

Our readers will remember the story of the electric railway mail service at St. Louis, which appeared in the ELECTRICAL REVIEW for March 4, 1893. There was described a system for the rapid delivery of local and suburban mails without any extra cost to the public. This is another instance of the superiority of an American institution over a British makeshift.

We are in favor of the effort now making in Pennsylvania to have a law passed regulating the age limit of railroad telegraphers. The limit in the original bill was placed at 20 years, but the bill may be amended to make the limit 18 years. The bill would be of better service in its original form. Railroad telegraphers have heavy responsibilities which are oftimes too heavy for young men of 18 to bear. Make it 20.

We have reliable information from Chicago that the rates of insurance on exhibits in most of the World's Fair buildings vary from five to ten per cent. *for the time;* in fact, the value of the exhibits is so much in excess of the insurance companies' ability to write that the rates are increasing every day, and the possibility of securing insurance will have passed before the Fair opens. The moral to electrical exhibitors is obvious.

We publish in full, in this issue, a copy of Prof. Alexander Graham Bell's telephone receiver patent granted to him on January 30, 1877, and which, consequently, is a vital force until midnight of January 29, 1894. Our object in presenting it to our readers is to remind those of them who are telephone inventors that this patent is still in existence. The claims contained in it are very broad, and intending inventors should govern themselves accordingly.

A good example of agrarian simplicity of action of the feminine order is afforded in the recent actions of Miss Mary K. Sands, who owns a farm at Darien, Conn. The Postal Telegraph Company wanted to run a telegraph line across the Sands farm, but neglected to obtain Miss Sands' permission. The linemen began to dig holes for their poles, Miss Sands objected, linemen kept on digging, Miss Sands hired men to fill the holes as fast as they are dug. At the end of the day the linemen were victorious to the extent of having four poles set. Next morning these poles are found sawed off flush with the farm and lying prostrate. On Sunday last the villagers turned out to see the war, but there wasn't any. The linemen didn't show up. Now Miss Sands has added a lawyer to her forces and swears no poles shall rise above her crops. But is the march of electrical progress to be halted by a farmer, and a woman farmer at that?

PRIVATE LINE TELEPHONES.

The business house of Kohn, Adler & Company, of Philadelphia, has had a little rub against the Bell Telephone Company. Recently a man called on the firm, who were using a short distance telephone line in their building, and, claiming to be an inspector for the Bell Telephone Company, ordered the removal of the instruments, threatening a suit for damages for infringement. These gentlemen requested the agent to inform them wherein their telephones infringed on the Bell patents, and to this request the agent refused to respond. The facts of the case were communicated to Mr. S. M. Plush, general manager of the Bell Telephone Company, of Philadelphia, who declared that no agents or inspectors, for the purpose stated, were employed by the company, and that the man, representing himself as such, was probably in the employ of the American Bell Telephone Company, of Boston. Now that the whole burden has been placed upon the shoulders of this latter company, the controversy is attracting considerable attention. Possibly the whole affair may wind up as a great mistake; still the outcome, if it is something definite, will be welcomed by all those business houses that have communication between rooms and find the telephone a most valuable means of accomplishing the desired end. Individual telephones, now that a fundamental patent has expired, are expected to be in greater use than ever, and all over the country we hear of new telephones for short distance transmission which are being manufactured to supply the demand. Several very compact sets have been devised, and we await their appearance with interest.

LETTERS FROM A LABORATORY.—XLI.

BY JULIAN A. MOSES.

A poorly finished instrument is very unattractive. The time that is spent in making it look neat is not time misspent, but is devoted to improving not merely outward looks, but even the working parts, for the finish on an instrument, no matter how inconsiderable it may be, stamps it as the product of a good or of a poor workman. The foreign makers are most particular in this respect, and spend much time on lacquering, polishing, blackening and bronzing the brass and iron parts. These processes are carried to a high state of perfection, notwithstanding the fact that there are persons who declare that the ornamental should not stand in the way of the useful; but even they will admit that a fine finish in the proper place adds to the usefulness of an instrument. This is the case, but it seems that the extra work and expense put upon an instrument designed for delicate and accurate measurements is an inducement to better work with the instrument, and the pleasure and facilities thus obtained perhaps even more than compensate for the additional time put upon its manufacture.

Polish is merely superficial and very little will spoil it. Looked at under a microscope the polish on brass or other metal is seen to be merely numbers of very fine scratches crossing or parallel to each other. It is the fineness of these scratches which makes the brilliancy of the polish, and anything that tends to protect the surface of the metal from unnecessary contact with rougher and harder bodies will preserve the brilliancy intact. Such substances are the lacquers which consist of some brilliant, hard and durable resin which has been dissolved in some easily evaporating solvent and allowed to dry upon the surface to which it has been applied. The best resin for this purpose is shellac, seed lac being often mixed with foreign matters which, to get rid of, require considering filtering. The shellac is dissolved in 95 per cent. alcohol. No absolute proportions are necessary, as all superfluous alcohol evaporates spontaneously. This makes what is known as ordinary brown hard spirit varnish and is the base of all lacquers. Bleached shellac has been advised, but it is not as durable as the unbleached.

In order to color the varnish, transparent materials must be used, such as the alcoholic solutions of turmeric, dragon's blood, annotto, gamboge, saffron, Cape aloes, etc., and may be added to the varnish until the required color is obtained. To some, the color of brass is not considered rich enough, and they use a predominance of dragon's blood in the varnish, which gives a deep reddish or orange colored appearance to the brass. Gum gamboge gives a pale yellow, and is a good material to tone down the harshness of the crude red. A recipe for a pale yellow lacquer, which is now used by one of the largest manufacturers of fine instruments in Europe, is:

Gamboge	1 part.
Cape aloes	2 "
Shellac	25 "
95 per cent. alcohol	to dissolve.

The color produced by this is very satisfactory, but the tints may be changed at pleasure by the addition of other coloring matters. Another European manufacturer uses for a gold lacquer:

Shellac	10 parts.
Sandarac	2 "
Turmeric	2 "
Dragon's Blood	¼ "
Alcohol, 95%	about 100 "

It is best to dissolve each substance separately and add it to the shellac in alcohol. Turmeric alone gives a delicate green, and when combined with a little gamboge gives the color to the rich green lacquer often seen on bronzes. In making up these lacquers care must be taken to have them perfectly clear and transparent, otherwise imperfect work will result.

There has been of late but little improvement in the art of lacquering, and generally the old workman can surpass the younger. A careful selection of brushes must be used, and they must be kept from all dust and contact with other bodies.

To get best results lacquer should not be applied to a cold body, but the metal must be so heated that when the brush, slightly moistened with the lacquer, is gently and evenly passed over the polished metal a little cloud of evaporating and condensing alcohol will follow in its wake. This even temperature is difficult to get at first, for, if the brass or iron is heated beyond the boiling point of alcohol, bubbles will be formed and the smoothness of the surface will be destroyed by the appearance of little spots of wrinkled varnish.

CORRESPONDENCE.

OUR DENVER LETTER.

The Georgetown Electric Light and Gas Companies have consolidated.

The Council of Colfax, a suburb of Denver, has granted the Consolidated Electric Light Company a franchise to furnish citizens with light.

The Progressive Trolley is to replace the old motor of the Park Hill Railway Company, arrangements having been made with the Tramway Company. The franchise for the change has been obtained and work will commence at once.

The Highlands Electric Company has begun the construction of a power house. It is to be a two-and-a-half story stone structure, and is located in the rear of the Arbuckle building. The plant when completed is to cost upwards of $75,000, and will have a capacity of 3,000 incandescent and 200 arc lights.

Senate Bill 234, a bill of unusual interest to electric light companies throughout the State, has received the signature of Governor Waite. The bill evidently places electricity within the category of that which is tangible. It decides that man can steal electricity. It is an act to punish any person or persons for taking electric light or gas without the consent of the owner, or for maliciously tampering with or injuring any electric or gas appliances.

The Colorado Telephone Company and the Highlands Electric Company are at war. The latter started to place poles on Colfax avenue near those of the former, and this caused trouble. Both companies had men on the ground, and for a time it looked as if things would wax decidedly warm, but as a preventive against serious trouble the Telephone Company secured a temporary injunction restraining the Highlands Electric Company from putting in poles until the matter can be given an airing in court. The Telephone Company claim that the close proximity of the light company's wires to theirs will, through induction, interfere with the workings of their telephones.

Denver Seems to be a Nucleus for the inventors of switches. First came one of the two largest wiring firms with an automatic switch. The opposition firm was not to be outdone and the enterprising young manager soon had his automatic switch upon the market. Each accused the other of infringing, but tiring of this mode of warfare their energies were exerted in advertising extensively and eloquently expounding the merits of their respective switches. Next came H. A. Triggs, of the Electric Specialty Company, with his one button flush switch. Excitement now reached fever heat. Hardly a bell hanger in town has not started to experiment in making an automatic, push button or snap switch, until Denver bids fair to block the wheels of the "spacious" departments of the patent office.

The Lesson Received by the telephone company during the recent wind storm will probably act as an incentive toward the placing of wires underground. During an almost cyclonic burst of wind nearly a dozen poles were blown down. These poles standing at a height of 35 feet, were erected four years ago and supported 300 wires. Some of the poles fell against upper story windows, while others, standing in front of buildings less tall, crushed through roofs, and it is miraculous that no one was injured. The loss to the telephone company, as stated by Manager Field, will reach $7,000. A Denver daily with characteristic newspaper knowledge of electrical matters, in giving an account of the above, stated that the wires were live wires, and that while they sagged down upon the sidewalk amongst pedestrians currents of the deadly fluid were passing through them. No lives, however, were lost through the agency, of the "deadly current," so evidently no sweet young lady operator was in the act of turning the handle of her magneto, or, by her melodious "What number, please?" generating currents of death-dealing properties. How the enterprising young reporter escaped electrocution is a mystery, for he was evidently handling things without gloves. J. R. K.

Denver, Colo., April 15.

OUR CHICAGO LETTER.

The Brush Electric Company has secured the contract to install a lighting plant in the new Lake Beach Hotel near Jackson Park. When completed it is claimed that this will be one of the largest isolated incandescent light plants in the country.

Twelve electric launches arrived at Jackson Park Wednesday, and a few hours later seven of them were rocking on the wind-tossed waters of the lagoons. By next Saturday three or four of the launches will be carrying passengers over the three mile course within the grounds.

Chandeliers 60 feet in diameter and weighing nine tons are being swung from the big trusses of Manufactures Hall at Jackson Park. The first one was put up Wednesday this week. It is really an electrolier, for when it is in place 78 arc lights of 2,000 candle-power each will be suspended from the steel structure. Five of these immense electroliers will be swung in the Manufactures Building. They will be raised 140 feet from the floor. The big one in the middle of the hall hangs directly above the clock tower. It weighs about 12 tons and will support 110 arc lights. Each of these electroliers is supported by a dozen or more steel cables.

Personal.—Daniel Coolidge, of the Johnston Rail Company, Pittsburgh, Pa., spent the past week in Chicago.—W. R. Mason, manager of the Railway Equipment Company, returned this week from a business trip throughout the East.—H. D. Fuller, president of the Excelsior Electric Company, was in Chicago last week closing some large contracts.—W. D. Ray, late of the Chicago & Northwestern Railway, is now connected with the Arc Light Department at Jackson Park.—George Cutter is pleased with the steady increase of Simplex wire orders for the buildings in and around the Fair grounds.—C. E. De Crow will read a paper on "Electro-Physiology" before the Chicago Electrical Association at its next meeting, April 25.—Messrs. Taylor, Goodhue & Ames will handle the Wagner alternating current motors this summer, and have already booked several fine orders.—P. K. Andrews, Western representative of the J. G. Brill Car Company, has just returned from a trip to West Baden Springs, West Baden, Ind., much benefited by the trip. M. J. B.

Chicago, April 15, 1893.

WORLD'S FAIR NEWS.

In the Electricity Building this week one cannot fail to notice a most remarkable change which has taken place during the past ten days. Instead of a great vacant space of floor room, covered by an immense roof, numerous small buildings, booths and pavilions are now in course of construction within this beautiful structure. A large force of men are busily engaged in unpacking exhibits, which are being received in large numbers daily. Among those most important which arrived this week are the exhibits from England, France and Germany, and from the great amount of stock now received it is safe to say all will be largely represented in this department. Work on the Edison tower is being pushed forward rapidly, and it has now attained such proportion as to give one an idea of what this beautiful structure will look like when completed. The following companies are now erecting booths and placing their exhibits: Brush Electric Company, Fort Wayne Electric Company, Thomson Electric Welding Company, Boston, Mass.; Ansonia Electric Company, Ansonia, Conn.; Norwich Insulated Wire Company, Harrison, N. J.; Chicago Electric Wire Company, Day's Kerite Wire, Western Union Telegraph Company, Commercial Cable Company, Mackay-Bennett Cable System. The latter company's booth is deserving of special mention. It is constructed of sycamore wood, inlaid with cherry, with beautifully carved inscriptions, and is an ornament to the northwest gallery.

The elevated electric road at Jackson Park, which is being constructed by the Columbian Intramural Company, at a cost of $700,000, is nearing completion. A trial trip was made on Saturday last over two miles of the road, and the results obtained were most satisfactory to the management. The party was composed of C. H. MacClaskie, electrical engineer; C. P. Mattock, chief engineer of the road; Director of Works Burnham, and a number of Exposition officials. The total length of track is 6¼ miles, laid on heavy timbered frames about 20 feet from the ground. The system used is what is called the "third rail," operating as an ordinary trolley system, except that the power is taken from a central surface rail underneath the train. The first car in each train carries four motors of 112 horse-power each, in the forward end, thus acting as a locomotive coach. The whole run of six miles can be made in 21 minutes. During the Fair they will be run slower, and will be operated three minutes apart. The block system, operating automatically, is used to prevent a possibility of accident. The trains in making their circuit make 19 stops and pass 10 stations, viz.: the south loop, near the Indian School; the Forestry Building; the colonnade, between Machinery Hall and the Agricultural Building; the Union Depot, near the terminal station where the South Side "L" discharges; the Chicago Junction, where the South Side "L" meets the Intramural, on the roof of the Transportation Building and 62d street. The other stations are located at 59th street, 57th street, Mount Vernon, the Virginia State headquarters, and at the north loop on the government plaza.

An official notice from Chief J. P. Barrett, of the Department of Electricity, reads as follows:

"Exhibitors in this department will please note that until May 1, 1893, all mail addressed to them should be sent care Department of Electricity, Electrical Building, World's Columbian Exposition, Chicago, Ill. After May 1, mail should be addressed to the Electrical Building, designating section and space number."

E. L. Corthell, chairman of the General Committee of Engineering Societies, has issued the following notice:

"The reception rooms and office of the general and executive committees of the Associated Engineering Societies of the United States and Canada, and of the general committee of the World's Congress Auxiliary on the International Engineering Congress, on and after May 1, 1893, and until the close of the World's Columbian Exposition, will be at No. 10 Van Buren street, Chicago, Ill.

"All communications after May 1 should be addressed to, or to the care of, Mr. Max E. Schmidt, secretary. Visiting engineers may have their mail thus addressed.

"The committee rooms of the Associated Societies at the Exposition will be situated in the southwest corner of the gallery of the Mines and Mining Building, where the secretary or some of the staff will be present during the Exposition to meet visiting engineers." M. J. B.

Chicago, April 13, 1893.

PERSONAL.

Mr. F. S. Gorton, secretary of the Chicago Edison Company, arrived in New York last week and will be here several days.

Mr. C. McL. Paine, formerly connected with the *Western Electrician*, and later with *Electricity*, has assumed the business management of the *Architects' Electrical Bulletin*, published by the Interior Conduit and Insulation Company, of this city.

Mr. John A. Barrett, the well-known electrical engineer and expert, has been elected to the presidency of the Elektron Manufacturing Company, of Springfield, Mass., vice W. D. Sargent, resigned. Mr. Barrett is rated as one of the most capable and conscientious electrical engineers of the day, and will undoubtedly prove a valuable acquisition to the official staff of the Elektron Company. Mr. Sargent's many duties prevented his giving the necessary time to the Elektron Company, so he resigned the presidency, although he still remains a member of the executive board of the company.

We are most pleased to learn that the experiment of running an electric railway through a portion of the city of Bangkok, Siam, has proven entirely satisfactory. Ponies for street car service are very cheap in Siam, which fact forms a competitive element that the trolley road does not have to contend against in other parts of the world. Our friend Mr. De Wolf Hopper, of comic opera fame and who established his interest in electrical progress by singing his famous "Birdie" song over the long distance telephone line from Chicago to Boston, will doubtless be gratified to hear this news, as he claims that most of his jokes have a Siamese origin.

An electrolytic copper refinery has just been established at Great Falls, Mont. The main building covers 157,500 square feet of ground and contains 288 depositing vats, which are filled with 1,600,000 pounds of pig copper in the shape of anodes. The total weight of copper wire connections in the plant is 55,000 pounds, and to line the tanks and complete the sulphate room took 650,000 pounds of sheet and pipe lead. The total cost was $350,000.

FINANCIAL.

A French company has been formed to work the Thomson-Houston patents, under the direction of M. Thurnauer, general manager of Thomson-Houston European companies.

Negotiations were in progress last week for the sale of all the local street railways in Cleveland, Ohio, to a syndicate of New York capitalists. The amount to be paid is said to be $8,000,000.

At a meeting of the directors of the Edison Electric Illuminating Company, of Boston, held on April 14, a quarterly dividend of two per cent. was declared, payable May 1, to stockholders of record at close of business on April 14.

The Edison Electric Illuminating Company, of New York, for March shows:

	1893	1892	1891
Gross	$102,956	$71,377	$49,710
Net	42,593	33,309	23,845
Accrued interest on bonds	13,541	9,375	8,333
Incan. lamps end March	150,759	104,332	69,101
Arc lamps	1,874	1,650	258
Motors, horse-power	4,067	2,321	868
Gross 3 months	$328,965	$236,426	$160,784
Net	164,777	120,568	82,912
Accrued int. on bonds	40,291	28,125	25,000

A press dispatch from Pittsburgh states that the annual meeting of the Westinghouse Electric Company will be held next month. It is stated that the total sales for the year aggregated in round numbers $5,800,000. The increase in the present capacity of the works as compared with the beginning of the year is nearly 100 per cent., by reason of the addition of new machinery and the lease of the old air brake works in Allegheny. The net earnings, after providing for all ordinary and extraordinary expenses, have averaged 25 per cent. of the amount of the sales, so that the earnings for the year ended March 31 will add between $1,100,000 and $1,200,000 to the surplus of the company, after providing for the seven per cent. dividend on the preferred stock.

A press dispatch from Detroit, last Saturday, states that the Detroit Electrical Works is embarrassed, owing to several reasons, principal of which is competition. The company was organized in 1876. For about 14 years the concern was prosperous, but two or three years ago there was a tremendous development in electric railways, and the company had to undertake expensive experiments. It raised its capital stock to $1,000,000 and floated $677,000 worth of shares. Of this, some $500,000 were taken up in Boston and a few other Eastern cities and the remainder by local parties. More money was needed, the creditors became clamorous, and President McMillan secured the company by paying and indorsing notes to the amount of $185,000. The company secured him by a mortgage on its entire property. But the total indebtedness amounts to $330,000, credits about $430,000. A good deal of the money is locked up in electric street railroad lines in the various States.

OBITUARY.

The death is announced of Mr. J. P. Hofstede, director-general of posts and telegraphs in Holland, at the age of 70 years, after 53 years of service.

The *doyen* of electricians, M. Archereau, the inventor of the first arc lamp regulator, says the *Bulletin Internationale*, has just died at Paris. He was also one of the inventors of the agglomerate carbons, but in spite of these useful discoveries, Archereau became so poverty-stricken that the newspaper *Figaro*, a few years ago, had to come to his succor. Latterly, however, he had found a modest position that allowed him to live, if not in luxury, yet without pain.

Some interesting and, we believe, new facts, regarding the Goebel lamp are printed in this issue of the ELECTRICAL REVIEW. The trial of the Columbia Incandescent Lamp Company's case, at St. Louis, occupied all of last week and Judge Hallett took it under advisement on Saturday. He expects to render a decision within a week. The arguments presented by both sides were long and exhaustive, and it may require more than a week for Judge Hallett to arrive at a decision. We receive telegraphic confirmation of these facts as we go to press, although further details are unobtainable at this writing.

General Electric Company's First Annual Report.

The first annual report of the General Electric Company, as of January 31, 1893, was submitted at the annual meeting of the stockholders of the company, held at Schenectady, N. Y., on April 11, 1893. The report in full is given below.

At the stockholders' meeting the following directors were elected to serve during the ensuing year: F. L. Ames, C. A. Coffin, T. Jefferson Coolidge, Jr., C. H. Coster, Thomas A. Edison, Eugene Griffin, F. S. Hastings, Henry L. Higginson, D. O. Mills, J. Pierpont Morgan, H. McK. Twombly.

The General Electric Company was incorporated April 15, 1892, and began active business on the first day of June, 1892; so that the report presented by your directors at this meeting of stockholders covers a period of eight months ending January 31, 1893.

As you know, the General Electric Company acquired in exchange for its stock practically all the capital stock of the Edison General Electric Company, of the Thomson-Houston Electric Company and of the Thomson-Houston International Electric Company. These three corporations, referred to hereafter in this report as the underlying companies, still retain their independent corporate existence. The first two continue their manufacturing business as before, the General Electric Company purchasing and distributing the chief part of the apparatus manufactured by them. The various selling and many other departments of the Edison General and Thomson-Houston companies have been gradually merged into corresponding organizations of your company.

The difficulties inherent in such a reorganization were many and serious, and we feel that the stockholders are to be congratulated that, largely because of the zeal and hearty co-operation of the former officers and employés of the Edison General and Thomson-Houston companies, it has been carried through to a complete and successful issue.

LOCAL LIGHTING AND RAILWAY COMPANIES.

While your company has about 6,000 customers included in the different departments of its business, the interesting and important development is in the direction of local lighting and railway enterprises.

The following information, with respect to local illuminating and electric street railway companies using your apparatus, will be of interest to the stockholders.

LIGHTING COMPANIES.

The total number of such central station companies using Edison and Thomson-Houston apparatus is 1,277, supplying about 2,500,000 incandescent and about 110,000 arc lamps.

The growth of these companies has been phenomenal, and it is very satisfactory to note that those which have been established longest are making the most rapid increase in size of plant and volume of business.

During the past year there has been a very marked appreciation in the value of the securities of local companies, especially in the larger cities, testifying to the increased confidence of investors in such properties.

RAILWAY COMPANIES.

	Feb. 1, 1891	1892	1893
Total number of roads operating and under contract	151	214	435
Total number of cars in actual operation	1,578	2,790	8,386
Number of miles of road in actual operation	1,252	2,315	4,027

During the past eight months there has been a notable increase in the size of individual machines manufactured at the different factories, as well as a large increase in the total factory output.

On February 1, 1892, the largest power generator manufactured was of 275 horse-power. Machines of 2,000 horse-power each are now being manufactured by your company, seven of which are already sold for early delivery. The largest lighting generators in use February 1, 1892, were capable of supplying only 2,000 incandescent lights each. There are now being constructed generators of the direct coupled type with a capacity of 12,000 incandescent lights each. Many local lighting stations are being equipped with steam engines directly coupled to such machines, giving a capacity of about 25,000 incandescent lights from each engine.

Of the largest direct coupled lighting generators which were manufactured a year ago, there were shipped during the year 1892 an aggregate of 7,000 horse-power. Of such sizes now being constructed there are at present on order 8,000 horse-power.

Machines for power purposes (principally railway) aggregating 40,000 horse-power have been shipped during the past year. There are now being manufactured, on order, generators aggregating 37,000 horse-power, or practically as much as the total shipments for the past year.

Most satisfactory progress has been made in the development of apparatus for mining purposes, particularly of locomotives for haulage work in coal mines. Thirty of such locomotives, with a very large amount of other mining material, are now under construction at the works.

The efforts of many of your best engineers have been directed for some time to the production of electric locomotives, for which we now have numerous orders, for haulage and general railway purposes. Two locomotives of 1,600 horse-power each, ordered by one of the principal trunk lines, are now under construction and nearly ready for use. The equipment of the elevated electric railway at the World's Fair, six miles in length, and which is now nearly completed, is being supplied from the Schenectady factory, and, it is hoped, will be in operation at the opening of the Fair.

LICENSEES.

The relations between your company and its various licensees and between it and those of the underlying companies are of the most satisfactory character. Your directors appreciate that the interests of the company are closely connected with the welfare of its licensees, and there is a corresponding recognition on the licensees' part that the cordial co-operation of your company is essential to the fullest development of their business.

No effort will be spared to secure from the recent patent decisions in your favor the greatest possible benefit to these licensees. The public, through them, will be distinctly benefited, because of the concentration of local illuminating and power business in the licensed central stations equipped for supplying light and power at minimum rates.

The prices at which apparatus and lamps are now furnished by the General Electric Company, for use of such stations, are in many instances lower than those which prevailed prior to sustaining the lamp patent, while the quality and efficiency of the apparatus are largely increased. Thus the licensees are enabled to cheapen their production and their prosperity is greatly enhanced—a prosperity in which your company has a direct and permanent share.

PATENTS.

The patent situation is encouraging and promising. The decision of the highest court sustaining the fundamental incandescent lamp patent, which decision has been followed by many other tribunals, has vested in your company the right to the incandescent lamp business of the United States, a result of great value to the company.

The strenuous efforts made by your competitors to develop an incandescent lamp which will not infringe this patent have been thus far wholly without success, and there is no reason to believe that any different results will be achieved in the future.

The decisions heretofore rendered in favor of the Thomson-Houston and Brush companies, covering the double-carbon arc lamp, automatic current regulation and electric storage, are of very great value to your company.

Although it is well known that the patented inventions of Edison, Thomson, Brush, Van Depoele, Rice, Sprague, Bentley, Knight and other inventors now or heretofore connected with your organization are the basis of substantially the entire arts of electric lighting, electric railways and electric motive power now in general use, the situation up to the date of the organization of the General Electric Company was not favorable to the best development of business under these inventions.

Suits against infringers are now in active progress on many important patents, other than those already sustained by the courts, covering essential features in electric railway, lighting and power apparatus. These suits will be pushed as vigorously as possible.

In dealing with the numerous past infringers, your directors are of the opinion that the substantial interests of the shareholders can be protected without a harsh or offensive exercise of your rights, and in such way as to greatly benefit the company and to satisfy consumers and the public of its desire to act in an entirely fair and liberal spirit.

FINANCIAL.

There are annexed to this report the company's condensed balance sheet and statement of profit and loss as of January 31, 1893, showing that in the eight months during which your company has been in operation its profits amount to $1,024,954.59 in excess of three quarterly dividends on the common and one semi-annual dividend on the preferred stock.

In order that the stockholders may understand the position of the company, the following explanation as to the general character of the items in the balance sheet is submitted.

INVESTMENT ACCOUNTS.

Under this head will be found the assets now represented by the stocks of the three underlying companies, substantially all of which have been acquired by your company.

Details in regard to these companies will be found on page 8, from which it will be noticed that the basis upon which they were acquired by your company represents a cost of about $8,000,000 for all their patents, other valuable rights, licenses and other contracts. This is after writing down the assets they still own—manufacturing plants, factory inventories, etc.—to conservative valuations.

The transactions of your company are to a considerable degree with local companies working under contracts licensing them to use the patents, about 2,000 in number, under which your company operates. Your company is now supplying apparatus to about 1,300 local companies, the royalties from which run from $1,500,000 to $2,000,000 per year. It is believed that the royalties will be greatly increased in the future, so that $8,000,000 would appear to be far within the actual value of the patents, contracts, etc., which are represented thereby.

Your company has to a large degree acquired the business, other than manufacturing, of the Thomson-Houston and Edison General companies, and has liquidated a large part of their liabilites. This course will be continued during the present year.

The preferred stock of the United Electric Securities Company has been sold since the close of the fiscal year at a price in excess of the value at which it appears in the balance sheet. The common stock of the same company—$825,500 out of a total issue of $1,000,000—is taken in the balance sheet at par. The company is making large profits and paying regular quarterly dividends.

The stock of the Canadian General Electric Company, a manufacturing and selling company controlling the Edison and Thomson-Houston patents in Canada, is taken at par. Its sale at an early date is expected, being now under option to a Canadian syndicate at above par.

The stocks of the Fort Wayne Electric Company and Northwest General Electric Company are paying eight per cent. dividends on the value at which they stand in the balance sheet.

Stocks of "miscellaneous companies" carried at $71,566, comprise holdings in various corporations not considered local or licensee companies.

OTHER ASSETS.

With reference to these items it may be stated that in the judgment of your Board they are taken at safe figures. They consist of stocks, bonds, cash, notes and accounts receivable, merchandise on hand and work in progress; and it will be noticed that they amount to $29,559,600.61 as against total current liabilities of $5,246,219.

The stocks of local companies, which appear in the balance sheet at $5,772,622.80 (par $11,362,011.65), have been valued carefully with the intent to carry them at a figure which can easily be obtained for them.* As a further margin in this respect, stocks amounting at par to $1,301,940 (most of which accrued to this company under license contracts with recently organized companies) are taken in the balance sheet at the nominal value of $1.00 for each block, although there is reason to believe that within a moderate time these will develop a substantial earning capacity.

The bonds are almost entirely those of local companies. They are nearly all first mortgage bonds, payable in gold, and stand in the balance sheet at about 70 per cent. of their face value. All of these bonds, excepting $439,000 at par value—$251,088.07 book value—are regularly paying their interest, and the comparatively small amount in default is carried at prices lower than it is believed will be realized.

Some of the bonds carried in the balance sheet have been sold since the close of the fiscal year at prices in excess of their book value, and the rest will be sold from time to time through the United Electric Securities Company and other channels as heretofore.

The amount now accruing to your company as dividends (exclusive of those received on the stocks of the underlying companies) and as interest from its holdings of stocks and bonds shown in the balance sheet exceeds the amount required to pay interest on your company's $10,000,000 outstanding debenture bonds.

After careful examination, deductions have been made from the notes and accounts receivable to cover fully all bad and doubtful items.

The item "Inventories" represents all the company's stock of apparatus, material, machinery, fixtures, etc., in the offices and storehouses of your company's seven districts, and includes the machinery, tools and material in the various repair shops connected with such district offices.

"Work in Progress" represents the actual cost to date of all labor, material, etc., on unfinished contracts now in course, which, when completed, will afford a considerable profit.

The cost of patents acquired by your company during the eight months has been charged off as an operating expense.

CONTINGENT LIABILITIES.

Your company makes a practice of endorsing and discounting some of the notes it takes from its customers. Such endorsed notes are not included in notes receivable in the balance sheet, where only those now held by your company are taken into account. The outstanding notes receivable which had been endorsed and discounted on January 31, 1893, amounted to $3,787,312.69.

By order of the directors.

C. A. COFFIN,
President.

*Included in this amount are shares of the Edison Electric Illuminating Companies of New York, Boston, Brooklyn, Philadelphia and Chicago of a par value of $2,625,300. The present market value of these stocks is in excess of $3,400,000, although taken in the balance sheet at $3,024,695. Besides these there have been acquired, in the usual course of business, shares of 137 other companies, a large part of which will probably be disposed of through the ordinary channels.

UNDERLYING COMPANIES.

EDISON GENERAL ELECTRIC COMPANY.

The cost of acquiring 149,699 shares of the capital stock of the Edison General Electric Company was	$14,969,900 00	
Less net amount credited to that company, after charging it with money advanced and with an arbitrary amount of $695,000 as a guarantee against its customers' notes and accounts transferred to the General Electric Company, and after crediting it with sundry assets taken over by this company	6,336,691 54	
Making present cost, as shown on the balance sheet		$8,633,208 46
This amount represents the following:		
Manufacturing plants, being the investment in lands, buildings, machinery and tools at Schenectady, N.Y., and Harrison, N. J.	$2,677,548 09	
Machinery and materials sold to U. S. Wire & Cable Company, but not yet paid for	282,147 76	
*Schenectady and Harrison factory inventories	2,576,687 14	
Cash and notes and accounts receivable	409,117 86	
Total	$5,945,700 85	
Less debt	1,551,660 71	
Leaving		$4,394,040 14
		$4,239,168 32

Represented by patents which have cost the Edison Company about $2,000,000, and by holdings of the entire capital stocks of Edison underlying patent-owning companies, under contracts with which all large Edison licensees give to the Edison Company a percentage of their entire issue of stocks and bonds.

THOMSON-HOUSTON ELECTRIC COMPANY.

The cost of acquiring 399,347 shares of the capital stock of the Thomson-Houston Electric Company was	$18,381,970 00	
Less net amount credited to that company, after charging it with money advanced and with an arbitrary amount of $1,000,000 as a guarantee against its customers' notes and accounts transferred to the General Electric Company, and after crediting it with sundry assets taken over by this company	9,965,118 22	
Making present cost, as shown on the balance sheet		$8,416,851 78
This amount represents the following:		
Manufacturing plant, being the investment in lands, buildings, machinery and tools at Lynn, Mass.	$1,240,066 77	
*Lynn factory inventory	2,263,347 59	
Cash and notes and accounts receivable	428,126 91	
Raw Copper	135,525 94	
Consignments	8,396 71	
Stocks of the Brush, Excelsior, Ft. Wayne and Schuyler Electric companies and stocks of other manufacturing and patent-owning companies (par value, $7,312,680), carried at $4,013,420.11; stocks of the Central Thomson-Houston, Eastern Electric Construction, Northwest General Electric, Thomson-Houston Electric Light and Thomson-Houston Motor companies (par value, $1,468,350), carried at $891,750.00; total, $4,905,170.11. Liquidation value, say	2,500,000 00	
	$6,575,463 92	
Less debt	1,547,964 21	
Leaving		$5,027,499 71
		$3,389,352 07

Represented by patents, including Brush patents on double-carbon arc lamps, storage batteries and patents on current regulation, all of which have

*Raw materials, materials in process of manufacture, with labor thereon added, and finished apparatus in stock, ascertained by actual inventories figured on liquidating values—*i. e.*, raw material at *present* cost prices, apparatus finished and in process of manufacture at cost of labor and material, and obsolete apparatus at "scrap" value.

been sustained in the United States courts, and by about 1,400 other patents owned by the Thomson-Houston Company and manufacturing companies controlled by it.

THOMSON-HOUSTON INTERNATIONAL ELECTRIC COMPANY.

The entire capital stock of the Thomson-Houston International Electric Company was acquired at a cost, as shown on the balance sheet, of		$1,212,000
This amount represents the following—		
Stocks of other companies	$13,189 00	
Cash and notes and accounts receivable	468,076 02	
Charges against its branch offices	468,944 69	
Inventory and consignments	39,049 98	
	$989,209 69	
Less debt	307,953 32	
		681,256 37
Leaving		$530,743 63

Represented by the rights in foreign countries under patents of Thomson, Rice and others, including contracts for delivery of $100,000 stock of the Canadian General Electric Company, and substantial interests in other manufacturing and exploiting organizations in foreign countries.

CONDENSED BALANCE SHEET, JANUARY 31, 1893.

ASSETS.

INVESTMENT ACCOUNTS.

Stocks of underlying companies:—			
Thomson-Houston Electric Company		$8,416,551 78	
Edison General Electric Company		8,633,208 46	
Thomson-Houston International Electric Company		1,212,000 00	
			$18,262,060 24
Real estate:—			
Edison Building, New York city		$410,804 62	
Less mortgage thereon		200,000 00	
		$210,804 62	
Other real estate		87,922 12	
			298,726 74
Stock of United Electric Securities Company:—			
Preferred (par, $454,300)		$408,870 00	
Common (par, 825,500)		825,500 00	
			1,234,370 00
Stocks of manufacturing and other companies:—			
Canadian General Electric Company (par, $1,000,000)		$1,000,000 00	
Excelsior Electric Company (par, 6,000)		1,300 00	
Fort Wayne Electric Company (par, 704,700)		352,350 00	
Northwestern Gen'l Elec. Company (par, 155,000)		155,000 00	
Miscellaneous companies (par, 481,033)		71,566 00	
			1,580,216 00
			$21,375,372 98

OTHER ASSETS.

Stocks and bonds of local companies:—			
Stocks (par, $11,362,011 65)		$5,772,622 80	
Bonds (par, 4,858,380 00)		3,400,629 07	
			$9,173,251 87
Cash		$3,871,033 58	
Notes receivable		5,151,950 64	
Accounts receivable		7,078,879 15	
			16,101,863 37
Inventories		$2,307,225 13	
Less 10 per cent		230,722 51	
			2,076,502 62
Work in progress			2,207,982 75
			29,559,600 61
			$50,934,973 59

LIABILITIES.

Capital stock:—		
Common	$30,426,900 00	
Preferred	4,236,900 00	
		$34,663,800 00
Five per cent. gold coupon debenture bonds		10,000,000 00

OTHER LIABILITIES.

Accrued interest on debenture bonds	$83,333 32	
Dividends declared but unpaid	608,538 00	
Notes and accounts payable	4,554,347 68	
		5,246,219 00
Surplus January 31, 1893		1,024,954 59
		$50,934,973 59

STATEMENT OF PROFIT AND LOSS, JANUARY 31, 1893.

EXPENSES.

Interest and discount	$89,513 42
Interest on debenture bonds	152,917 17
Dividends paid and dividends declared but not yet paid	1,971,056 50
Patents now charged off	118,151 42
Surplus carried forward	1,024,954 59
	$3,356,593 10

EARNINGS.

Net profits from the business of the eight months, over and above all expenses, deductions for bad debts, etc	$3,356,593 10
	$3,356,593 10

E. & O. E.—April 11, 1893. J. P. ORD, *Comptroller.*

Important German Patents.

Dr. Phil. H. Zerener, of Berlin, has sent us the following list of important German patents issued from March 23 to April 1, 1893, by the Imperial German Patent Office:

ACCUMULATORS.

41 B. 13685. Electrode for electric accumulators. A. Brandenburger, Hamburg.

ELECTRIC LAMPS.

41 H. 12839. Electric arc lamp with oscillating electromagnet and immobile armature. F. Hansen, Leipzig-Reudnitz.

MISCELLANEOUS.

41 H. 13032. Pliant insulating tube for conducting wires. F. Blake, Frankfurt a/M.

41 P. 5886. Regulator for galvanic currents. C. H. Prött, Jr., Rheidt.

70 B. 13159. Electric apparatus for multiplying handwriting, drawings, etc. E. and D. Broida, Berlin.

75 M. 9191. Apparatus for electrolysis.

75 M. 9378. Apparatus. J. Marse, Bad Nauheim.

41 F. 6560. Contrivance for preserving irregular indications of electrical measuring apparatus. D. F. Fromme, Munich.

41 H. 13830. Electric engine. Addition to patent 45840. Hartman and Braun, Frankfurt a/M.

48 D. 5316. Preparing electro deposits upon aluminium. Deutsch-Osterr Mannesmannvöhrenwerke, Berlin.

The New Standard Kennelly Meter.

This instrument consists of a flat horseshoe magnet with its poles brought out into semicircles facing each other and separated by about $\frac{1}{16}$ of an inch. This large polar surface and narrow air-gap make a magnetic circuit very nearly closed. It is well-known that a solid anchor ring of steel uniformly magnetized round its circumference has no demagnetizing force, and therefore no tendency to alter its magnetization. A saw cut across such a ring, introduces an air-gap that establishes a demagnetizing magneto-motive force equal to the product of the flux and the air-gap reluctance. As the air-gap broadens, and its reluctance rises, this back magneto-motive force increases, making the magnetic condition of the whole circuit more and more unstable, and rendering it more difficult to find a quality of steel that will have sufficient hardness and retentiveness to withstand this demagnetizing influence, while the narrower the air-gap the more permanent and stable the magnetic condition must remain.

In the narrow space between the semi-circular pole faces is pivoted a disk armature, as shown in the accompanying illustration, the plane of the disk being parallel to the polar surfaces and midway between them. Starting from the center the insulated wires forming the armature winding are laid radially and symmetrically over the upper surfaces of the disk, the accuracy of angular spacing being mechanically preserved. One-half of the disk is completely covered by the pole faces, and the other half projects beyond them.

Two spiral springs bring the measured current into and from the disk, acting at the same time as a restoring couple, as in the instruments of Cauderay and Gimingham of 1886. When the current passes through the armature, an electro-magnetic pull is set up in the plane of the disk, urging it to right handed or left handed rotation, according to the direction of the current. As the disk moves in obedience to this force, as many radial wires enter the poles on one side as leaves them on the other, so that the electro-magnetic force corresponding to the current strength remains uniform, while the retractive force from the spiral springs increases directly with the angle of displacement. In this way the angle through which the disk and its attached pointer move is proportional to the current strength, and the graduations of the scale are nearly uniform. The scale itself is wide, and covers an arc of about 125 degrees.

The shaft bearing the disk is pivoted on agates to reduce friction, and the whole

FIG. 1.—THE NEW STANDARD KENNELLY METER.

armature complete only weighs a few grammes, so that it is not liable to be damaged in transport. The instrument will register in any position, but is most sensitive when resting horizontally. The total absence of iron from the armature ensures freedom from hysteresis or magnetic lag.

The instrument is very light, weighing six pounds in its wooden case. It can be made in any capacity up to 100 amperes. It is not affected by the earth's magnetic force, nor even by the stray field from dynamos beyond a few feet radius. Its resistance and inductance are very low. Its frame is very strong and compact, being supported entirely on the magnet, which is again secured to the base with the intervention of soft rubber washers.

The meters are all adjusted and standardized at the Edison Laboratory, by comparison with the standards there maintained. The scales are read off over mirrors to avoid parallax, and the movements of the needle are practically dead-beat.

distribution of flux between the poles of different instruments would essentially produce corresponding variations in their scales.

In this instrument, however, the winding is spread uniformly over the surface of the disk armature, which is only partly covered by the field, and consequently no movement of the armature within the range of indication can alter the relation between winding and magnetic field, however irregular the latter may be, for as many wires enter the field as leave it, and if any part of the winding is exposed to an unduly great or unduly feeble flux density at the outset, the same number of wires will always remain under that influence throughout the motion. This ensures great regularity in the scales of different instruments, and also ensures uniformity of any accidental error in the same instrument, all over its scale.

The freedom from tendency to demagnetize, owing to the broad polar surface and narrow air-gap, is also a prominent feature.

The instruments are manufactured by the Edison Manufacturing Company, of 110 East Twenty-third street, New York city.

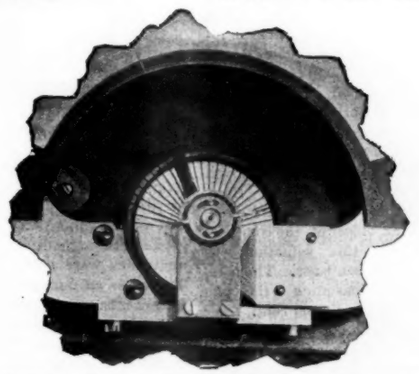


FIG. 2.—INTERIOR VIEW OF THE NEW STANDARD KENNELLY METER.

No instrument of its type has yet made its appearance in which the magnetic circuit is so nearly closed, and this is the special advantage of the disk armature form.

The binding posts are large and strong. The case is handsome and the workmanship of the highest grade.

A considerable advantage possessed by this form of ammeter is its independence of the distribution in magnetic flux through the armature. If this latter consisted of a spool or compact coil moving from one part of the field to another, under the influence of the current, the electro-magnetic force, and, consequently, the deviation of the pointer, would depend upon the local intensity of field at the point then occupied by the coil, so that accidental variations in the

LITERARY.

"Proceedings of the United States Naval Institute," Vol. XIX, No. 1, has been received.

The catalogue and announcements of the University of Pennsylvania for 1892-93, have been received.

"Reports from the Consuls of the United States," for December, 1892, January and February, 1893, have come to hand.

The Register of Union College Alumni Association of New York for 1892 has been received from Mr. Geo. F. Allison, the secretary.

"Vade Mecum," by D. B. Dixon, with an electrical appendix by Thos. G. Grier. 480 pages, 8¼x5¾, bound in cloth. Laird & Lee, Chicago. Price, $2.50. This is a compilation of information which must prove valuable to every working man, from the president of a big electrical company to the dynamo tender. The information is arranged so as to be easily available and covers a multitude of subjects.

The exhibition number of *Scribner's Magazine*, which has been in preparation for nearly a year, is planned to be the finest example of an American magazine ever produced. It will be published simultaneously with the opening of the World's Fair. This issue will contain about one-fourth more reading matter than usual, and illustrations of an abundance and richness never before attempted in any magazine.

Wall Street and the Electrical Stock Market.

The general financial situation in Wall street at this writing is very weak. The market for the various securities is narrow, hesitating, and portrays a decided lack of confidence in the stability of our monetary system. This is due in the main to the continued and heavy gold exports, and the causes which promote them. On Tuesday we sent out 3½ million in gold; to-day 1¼ million was shipped, and the indications are that there will be further heavy exports on next Tuesday. This movement, it is generally conceded, is in response to a demand upon us to settle the balance of trade, which is largely in favor of Continental interests. Usually at this season of the year we are heavier sellers than buyers. The order of affairs, owing to the congestion of business on the other side, has been reversed. Continued exports of gold are rapidly reducing the fund in the Treasury to the hundred million dollar reserve which was fixed as the minimum. In a week or ten days this will of necessity be cut in upon, unless protective measures are taken before that time. In the former contingency it will be necessary for the government to clearly define a financial policy. This can be either one of two things. An issue of bonds quoted above, or a consent to draw upon the hundred million reserve. In either event, it is believed that confidence will be restored and that values will respond. During the week money was easy on call, ranging between 3¼ and 4½ per cent. Various commercial agencies report the state of trade throughout the country as being fair, but that it makes little promise of a continuance. It is believed that the apprehension which is so keenly felt in Wall street is commencing to have its effect in the interior.

ELECTRICAL STOCK MARKET.

The features of the week in this line of specialties were the annual report of General Electric, a good market for General Electric and Edison Electric Illuminating bonds, and a moderate inquiry for some of the less active stocks.

General Electric's annual report (which is given elsewhere in this paper) was received by the Street with stationary quotations. This indicates that any showing which it made calculated to affect the quotation of the stock had been discounted. The one weak point in the statement, according to various Wall street authorities, is the large number of stocks of local companies which it holds, and which the trading element in the Street is apt to regard as an incumbrance. Its balance sheet shows stocks to the amount of $11,362,012 and bonds $4,853,303, making a total of $16,220,395, reckoned at par. The class of these securities may in a measure be determined by the fact that, while the last mentioned sum is the par value, the actual inventory value as given in the balance sheet is $9,173,252. However, in this connection it is but fair to cite the statement of an officer of the company to the effect that this valuation was made on an eight per cent. basis. The management figured that, inasmuch as the company's stock is paying eight per cent., these securities should should be upon the same basis. Another point in favor of the company is the claim that these securities are steadily enhancing in value, and that in time they will be worth considerably more than at the present. A point of interest in this connection is the report made from Boston that the company intends within about a month to issue bond "Series E," to represent about $1,000,000 of these accumulated securities. In the market the stock was moderately traded in and quite firm, between 106 and 107. There is believed to be quite a heavy short interest, which was acquired during the recent slump to 96, and also a number of calls below the present market quotation, which expire about the last of this month. Large holders of the stock are talking very bullish, and claim that it will be advanced materially before May 1. It is known that Drexel, Morgan & Company, leading spirits of the company, have lately acquired a great deal of stock. This fact is suggestive, inasmuch as it reflects a very substantial faith in the property.

The Edison Electric Illuminating Company, we are officially informed, will not be placed upon a seven per cent. basis this year. It was recently raised from a five to a six per cent. basis, and although the net earnings are largely in excess of the amount necessary to pay six per cent. on the stock, we understand that the policy of the company will be to utilize the surplus in making further improvements, which in turn will materially increase the earning capacity. The March statement of the company makes the following showing:

	1893.	1892.	1891.
Gross earnings	$102,956	$71,377	$49,710
Op. & gen. ex., incl. taxes.	59,362	38,067	25,864
Net earnings	$43,593	$33,309	$23,845
Accrued interest on bonds.	13,541	9,375	8,333
Gross earnings 3 months	328,965	236,426	160,784
Net earnings 3 months	164,777	120,568	82,912
Accrd. int. on bonds 3 mos.	40,291	28,125	25,000
Incan. lamps end of March.	150,759	104,332	69,101
Arc lamps end of March	1,874	1,650	258
Motors, h. p., end of March.	4,067	2,321	868

A few investment orders were executed in the stock during the week at prices ranging from 125⅜ to 126½. The debenture bonds received comparatively heavy sales at 121 to 122. These bonds are convertible into stock, par for par, and it is for this purpose that the stock was recently increased $3,500,000. In order to avail of the July exchange, it will be necessary to give notice to the company on the 22d of this month. The fact that these bonds are earning five per cent. and selling so near the six per cent. stock is due to the convertible privileges.

Western Union was comparatively neglected throughout the week, although quotations were quite firmly maintained. There was an unusual demand for the collateral trust five bonds, which resulted in advancing the quotation a fraction to 104.

The Westinghouse Company, according to Western advices, will have a surplus of between $1,100,000 and $1,200,000 for the year ending March 31, after paying a seven per cent. dividend on the preferred. The company's sales for the year aggregated $5,800,000. The stock is comparatively firm at unchanged quotations.

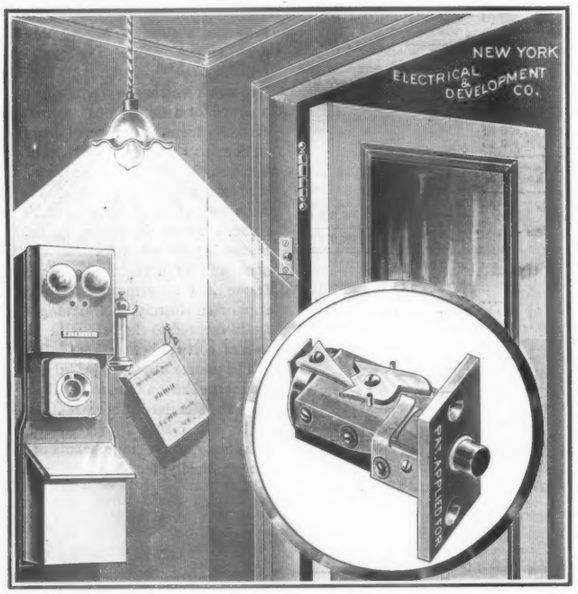
American Telegraph & Cable fluctuated between 88½ and 90 on limited sales. It is one of the sub-companies of the Western Union, and is guaranteed five per cent. by the latter company. As an investment, it is regarded about as good as Western Union, which earns the same amount and sells at somewhat higher figures.

North American showed some weakness toward the close of the week, dropping one point to 10½. The annual meeting will be held next month. The low values of the stock do not indicate features of an encouraging nature, as a result of the year's business. It is known that its electric lighting and street railway plants of Milwaukee and Cincinnati are in excellent condition and are making good returns. On the other hand, the large blocks of second class securities, notably those of Northern Pacific, which are a part of the North American Company's assets, are not regarded with favor by investors.

The American Telephone & Telegraph Company has increased its capital stock from $100,000 to $7,500,000. The amount of capital of the company actually paid in is $5,000,000. Its debts and liabilities are $1,476,942. The company maintains the long distance lines which traverse the country.

The Edison Electric Illuminating Company, of Brooklyn, this week listed $1,000,000 additional capital stock on the New York Stock Exchange, making a total listed of $2,500,000, the authorized capital. This company pays dividends quarterly at the rate of five per cent. per annum. The condensed balance sheet for the quarter ending March 31, 1893, is as follows:

License account	$570,000
Construction account	1,570,256
Accounts receivable	59,447
Supplies on hand	47,146
Cash on hand	7,855
	$2,254,704
Capital stock	$1,500,000
First mortgage bonds	500,000
Bills payable	100,000
Accounts payable	30,735
Reserve fund	25,000
	$2,155,735
Net credit profit and loss account, March 31, 1893	$98,969.92



A Novel Automatic Electric Light Switch.

Following is given transactions in active stocks and bonds and the bid and asked price in both active and inactive stocks and bonds:

ACTIVE STOCKS.

	H'g'st.	L'w'st.	Bid.	Asked.
American District Tel.	65	59	59½	61
" Tel. & Cable	90	88¼	88⅝	89¾
" Bell Tel.	190	188½	189½	190
General Electric	107¾	106	106	106⅛
Do., Debenture 5's	100	99¾	99	99½
Edison El. Ill., N. Y.	126½	125	....	125
Do., 1st 5's	122½	121	....	122½
North American	11⅛	10½	10½	10¾
West'ghouse, common	....	....	36	36½
" pfd.	....	....	48¾	49
Western Union	95¼	93⅜	93¾	94
Do., Col. Trust 5's	104	103¾	103½	104

INACTIVE STOCKS.

Electric.	Bid.	Asked.
Con. El. Storage	2	3
Edison El. Ill. Brooklyn	108	110
" " Boston	150	150½
Int. Conduit & Ins.	63	65
Edison Phon. Toy Mfg.	20	30
Fort Wayne Electric	12½	13½
Thomson-Houston Ser.	7¾	8
" " Inter.	242	250
" " " pfd.	105	108
Thomson Weld	59¾	60
" Europe. Weld	6	6¼
Telegraph.		
Central & South American Cable	....	115
Commercial Cable	140	170
Franklin Cable	38	42
Gold & Stock Cable	170	185
Mexican	....	200
Northwest Guaranty	104	....
Pacific & Atlantic	50	60
Postal Telegraph	....	80
Southern & Atlantic	78	80
Telephone.		
Erie	45½	46
Mexican	1.05¢	1.10¢
New York & New Jersey	95½	97½
New England	54¼	56
Tropical	5¢	10¢

New York, April 15.

A Novel Automatic Electric Light Switch.

One of the most ingenious electric switches yet placed upon the market is the one illustrated herewith, and which is designed to control the light in a room by allowing the lamp to burn while the room is in use and extinguishing it when the person using it has finished. The switch also has a wide application in connection with electric gas lighting apparatus. It is especially valuable for telephone booths, refrigerators, ice houses, bank vaults and all other places where an occasional and economical use of the electric light is necessary.

The switch proper is attached to a plate which is sunk flush with the door-jamb of the door opening into the room, and is operated by the action of the edge of the door closing and releasing a push button, set in the flush plate, as the door is opened and shut. Our illustration shows the switch in half size.

The push button operates a spring-actuated shaft running through a block of fibre with a circular stop at its rear end. A triangular shaped tooth is loosely attached by a screw to the top face of the stop and a flat brass spring fixed on the stop presses lightly on the two smaller points of this tooth. Mounted freely on the upper face of the block of fibre is a metallic knife-edge with two saw teeth depressions which engage with the triangular tooth. On the left hand side of the block of fibre looking toward the plate are two connection strips of brass between which the knife edge forms a sliding contact, and to which the lamp connections are made with screws and washers.

These contact strips are insulated from the rest of the switch and from each other by pieces of fibre.

When the door of a telephone booth, for instance, is closed, the push button is flush with the plate, the tooth is disengaged from and out of contact with the knife edge, and is held in a straight line by the flat spring pressing on its smaller points, and there is no light. On opening the door the push button is released, the tooth strikes the right hand depression in the knife-edge, which is forced between the contact strips, and the light is turned on. After entering the booth and closing the door, the tooth is disengaged from the right hand depression in the knife-edge, leaving the latter between the contact strips, however, and consequently the light still burning. In leaving the room the door is opened, the push button is released, the tooth flies into the left hand depression in the knife-edge, throwing it out of contact with the strips, and therefore shutting off the light. The switch is shown in this position in the illustration. The closing of the door after leaving the room depresses the push button, releases the tooth from the left hand depression in the knife-edge, which remains out of contact with the strips, the light is still off, and the switch is ready for another action as described above.

The New York Electrical and Development Company, of this city, manufacture this switch.

Chicago Edison Company.

The Chicago Arc Light and Power Company has now been officially absorbed by the Chicago Edison Company and a new company, called the Chicago Edison Company, has been formed by the consolidation of both interests, with a capital of $3,000,000. The Arc Light Company received $2,200,000 in debenture bonds of the Edison Company, or at the rate of 120 for its stock. The bonds bear six per cent. interest and now sell at 97.

The Edison stockholder receives in stock in the new company one-third the number of his present holdings gratis. He is also permitted to subscribe at par for 60 per cent. of his present number of shares in the company. The dividend is now eight per cent. and as the earnings of the Edison Company were 21 per cent. on $1,450,000 (its capital last year), the new company should easily and probably will continue to pay the same rate of dividend on its increased capitalization. Edison stock now sells at 240 and the new company's stock, in the estimation of competent authorities, should bring not less than 170.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

GETTYSBURG, PA.—The Gettysburg Electric Railroad Company has awarded the contract for building the road to Duerr & Company, of Philadelphia.

SEATTLE, WASH.—D. T. Denny & Sons have purchased the Front Street Cable Railway. The power plant will hereafter be operated by electricity instead of steam.

PAWTUCKET, R. I.—The Pawtucket Street Railway will be extended from Valley Falls to Lonsdale.

DENVER, COLO.—A franchise has been granted to the Park Railway Company to change its motor line to an electric road.

TARRYTOWN, N. Y.—The Hudson River Traction Company; capital, $5,000. Incorporators, E. M. Davison, J. M. Wainwright, A. J. F. Van Deventer and G. E. Rose, of New York city.

VICKSBURG, VA.—A consolidation of the Vicksburg Street Railway Company and the Hill City Electric Light Company is now being arranged.

BALTIMORE, MD.—All franchises and rights of way have been secured or guaranteed for an electric railway between Baltimore and Washington, and construction work will begin at an early date. The road is to be 38 miles long and $1,500,000 capital has been subscribed. It is understood that Alexander Brown & Sons, bankers, of Baltimore, are in the enterprise. This enterprise is not connected with the Traction Company's projected electric road and boulevard between the two cities.

FLORESVILLE, TEX.—Edward Goldstein has been granted a franchise to construct an electric street railroad in Floresville.

LAFAYETTE, IND.—The Lafayette Street Car Company will build a new electric power plant.

BALTIMORE, MD.—The stockholders of the Traction Company have voted to increase the capital stock to $10,000,000. The present capital is $5,000,000, but not all the increase will be issued at once.

ATHENS, TENN.—There is talk of the Athens Street Railway being reorganized. If this is done the road will be equipped with electricity.

WINTON, PA.—The Mount Vernon Electric Street Railway Company has been incorporated with a capital of $20,000.

FARGO, N. DAK.—J. H. Bowman, representing St. Paul and Eastern capitalists, has applied to the city councils of Fargo and Moorhead for a franchise to build an electric street car line connecting the two cities.

BROOKLYN, N. Y.—The Brooklyn City Railroad Company has begun the construction of an electric surface road to Bowery Bay.

EDINBORO, PA.—The borough council has granted a franchise to the Cambridge and Edinboro Electric Railway Company.

LACONIA, N. H.—The Laconia and Lakeport Street Railway Company is making extensive improvements to its road, and will reconstruct the entire line, so that it may be in proper shape when the company decides to adopt electricity as a motive power.

NEW HAVEN, CONN.—The State Street Horse Railroad Company has decided to commence work at once on equipping its lines with electric power.

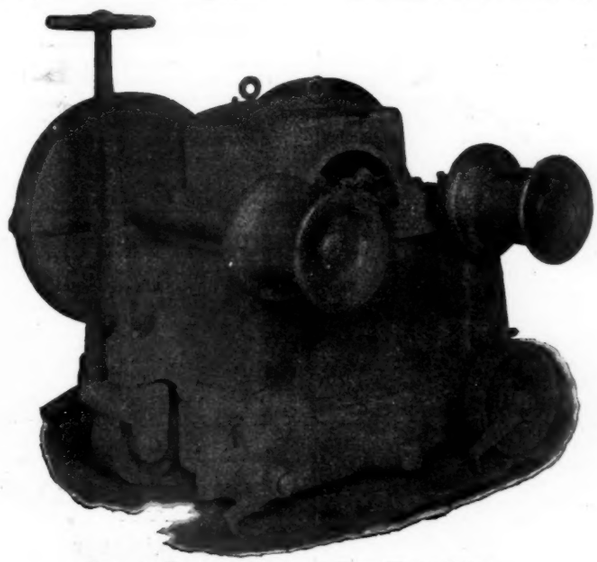
CONSHOHOCKEN, PA.—The Gladwym Electric Railway Company; capital, $12,000. Incorporators, Richard Hamilton, Hugh W. Barrett, Wm. M. Brownback and Walter W. Hood. The line will run from Ardmore to the junction of the Conshohocken state road and Merion Square road.

Electric Light and Power.

PUYALLUP, WASH.—The city council has under consideration a plan to build a municipal electric light plant.

BUCHANAN, MICH.—The Buchanan Power and Electric Company has been incorporated with a capital of $100,000.

ELLICOTTVILLE, N. Y.—The trustees have granted McMahon & Company an exclusive franchise to erect poles and string wires for an electric light plant.



GENERAL ELECTRIC COMPANY'S FOUR WINCH HOIST.

HANOVER, PA.—The Hanover Heat, Light and Power Company has been granted a franchise for an electric light plant.

CANTON, O.—The Canton-Salem Electric Company; capital, $30,000.

CLEVELAND, O.—The Atwater General Electric Company; capital, $14,000. Incorporators, Frank B. Many, George M. Schwabs, Arthur S. Atwater, L. Case and Wallace A. Merrill.

DONALDSONVILLE, LA.—The Donaldson Ice Company contemplates putting in an electric light plant.

CALAVERAS, TEX.—The Calaveras Brick and Tile Company will put in an electric light plant.

ASHTABULA, O.—This town has voted to issue bonds to the amount of $150,000 to pay for an incandescent plant.

HILLSDALE, MICH.—At a recent election a proposition to establish an electric light system was carried.

DUNKIRK, N. Y.—Ex-Mayor Martin has petitioned for permission to establish an incandescent electric light plant in Dunkirk.

BIRMINGHAM, ALA.—The General Electric Company, of Boston, has secured a controlling interest in the Birmingham Consolidated Electric Light Company. A new plant will be erected.

ORANGEBURG, S. C.—The Orangeburg Manufacturing Company; capital, $15,000. Incorporators, J. G. Wannamaker, M. G. Salley and Abial Lathrop. The company is authorized to furnish electric light and power.

LEADVILLE, COLO.—The Leadville Water and Power Company has secured a franchise to erect another electric plant in Leadville. The company is capitalized at $150,000 and agrees, in addition to furnishing light for the city, to supply 500 horse-power for use in running mining machinery at a saving of 40 per cent. under the present system.

PERTH, ONT.—The Tay Electric Light Company; capital, $30,000. Incorporators, John G. Haggart, of Ottawa city; Thomas A. Code, Geo. R. McCarthy and James M. Balderson, of Perth.

New Manufacturing Companies.

RICHMOND, VA.—The Electric Construction Company; capital to be not less than $2,000 nor more than $25,000. Andrew Pizzini, president; Charles R. Winston, secretary, and W. B. Pizzini, treasurer. The company will manufacture and sell all kinds of electrical machinery, apparatus and appliances.

IRON MOUNTAIN, MICH.—A company has been formed to build a dam at the confluence of the Menominee and Pine rivers, three miles distant. The company will generate electricity and transmit it to Iron Mountain for manufacturing purposes.

SYRACUSE, N. Y.—The Excelsior Street Car Heater Company; capital, $10,000. Incorporators, Gabriel A. Morris, Hiram J. Wattles and Bingham N. Bailey.

ST. LOUIS, MO.—The Commercial Electrical Supply Company; capital, $15,000. Incorporators, Ernest Michaelis, A. C. Einstein, R. E. Einstein and others.

New Telephone Companies.

PORTLAND, ORE.—The Cape Horn Telegraph Company; capital, $10,000, has been incorporated by M. Lavenson, J H. McKibben and I. R. Birt. The company intends to build telegraph lines from Troutdale to Portland and Astoria to Seaside.

DAYTON, PA.—The Armstrong Telephone Company; capital, $3,000.

MILWAUKEE, WIS.—The Milwaukee Telephone Company has sustained losses, amounting to over $50,000, by the recent storms here.

The New England Telephone and Telegraph Company is arranging for the construction of conduits for the larger part of its Springfield, Mass., wires.

General Electric Company's Four Winch Hoist.

The four winch hoist for use on wharfs and on vessels is the latest device of this character which the General Electric Company has perfected. It has been designed to meet a growing demand for apparatus which will satisfy the varied requirements of ship and dock work, and it offers special advantages to which the steam hoist cannot lay claim. It is more compact, less weighty, and does not require the special attention of a trained engineer. It can be used in cold weather without the waste of power attendant upon the use of steam by great steam condensation, and there are no burst or leaking pipes connected to it as with hydraulic hoisting apparatus.

For use on shipboard, the winch head hoist is more convenient than the drum hoist, as it is better adapted to the variety of hauling and hoisting incident to the manipulation of a ship's cargo. A number of loads may be raised or lowered simultaneously, each winch head being independent of the others.

The apparatus illustrated consists of a base frame, a motor, two shafts, each carrying two winch heads, and the necessary controlling apparatus. The frame is a strong cast-iron box open at top and bottom, and supporting on its upper rim the motor and winch shaft bearings, each furnished with self-oiling mechanism. The frame is provided with wheels for convenience of application. The motor is of the latest design and is entirely enclosed by its own frame, with the exception of two small lateral openings which allow of ready access to the brushes and armature bearings, and which are closed when the hoist is in operation. It is so set in the hoist frame as to secure a low center of gravity and great rigidity. The field coil of the motor and winding of the ironclad armature are covered with special waterproof composition.

The winch shafts are of large diameter steel rod, to obviate the possibility of bending under heavy loads. The winch heads are keyed to the shafts over bronze bushings and the difficulties which rust might create forestalled. Each winch is provided with two safety pawls, which, when the hoist is in operation, are held out of action by centrifugal force, but which immediately catch into notches provided in the bearing cap if the current fail while a load is being hoisted. This prevents overhauling of the hoist by the load, which might otherwise happen with disastrous results. The apparatus for controlling the hoist is placed below the motor within the frame, where it is protected from mechanical injury and moisture.

The particulars and dimensions of this hoist are as follows:

Net horse-power of hoist at winches, 45 horse-power; normal speed of motor, 425 revolutions; voltage of motor, according to order, 110, 220, 500 volt; current at 110 volts, 360 amperes; total weight of hoist, complete, 8,000 pounds; lifting capacity of hoist, two weights simultaneously, 3,000 pounds; speed of lifting, 250 per minute; diameter of winch heads, 12 inches; length of winding space on winch heads, 9½ inches.

Over-all dimensions of hoist are as follows: Length, 6 feet 10 inches; width, 6 feet 7 inches; height with wheels, 4 feet 7⅛ inches; height without wheels, 4 feet 5½ inches.

H. W. Johns Manufacturing Company.

This well known company will have no less than four exhibits at the World's Fair, including a handsome display of their electric railway line materials and insulators. Mr. W. F. D. Crane, manager of the H. W. Johns Manufacturing Company's electrical department, has been in Chicago for the past three weeks supervising the installation of this exhibit.

The New York and New Jersey Telephone Company is issuing a neat advertisement in the shape of handsomely engraved passes which entitle the bearer to conversation over the lines in the territory covered by the company at any time between 6 P. M. and midnight.

KINDRED INTERESTS

The J. T. Case Engine Company, of New Britain, Conn., has issued another new and up-to-date catalogue describing the Case automatic high speed engine.

The Wheeler Condenser and Engineering Company have removed to their new and commodious offices at 39 and 41 Cortlandt street, New York city.

On and after April 1, 1893, the business formerly done under the firm name of Porter & Leavitt Electric Motor Company, of Providence, will be done under the name of the Leavitt Motor Company.

The Utica Electrical Manufacturing and Supply Company, Cornelia street, Utica, New York, has issued a neat catalogue illustrating and describing their well known electric light and power appliances.

The Caldwell Boiler Company, 15 Cortlandt street, New York, has been awarded the contract to furnish 455 horse-power of boilers to the Western Union Telegraph Company, for their building corner Broadway and Dey street.

The Drake, Payson & Whittier Electric Company, of Providence, R. I., held an electrical opening at their new store, 170–172 Weybosset street, on April 15, from 4 to 10 o'clock P.M. Mechanical electrical appliances, from private house wiring to motive power, were exhibited to a large number of visitors.

The 1893 Model of the Lundell fan motor embodies a self-oiling and self-aligning bearing. The new design of fan guard gives the outfit an artistic appearance, and the black japanned finish is proving popular. This new model is a striking exposition of the character of the electrical novelties of the Interior Conduit and Insulation Company.

A representative of the REVIEW, while visiting the Crocker-Wheeler Motor Company's new offices in the Taylor Building, 39–41 Cortlandt street, was informed that they were at home in their new quarters. They also stated that they were all moved over to their new factory at Ampere, and toward the end of the next week would be in apple-pie shape. Their handsome suite of offices in the Taylor Building places them in direct communication with the business center of New York, which is in the vicinity of this building.

The Ball and Wood Company, of New York, is the first to have its exhibit complete in Machinery Hall, under the supervision of their engineer, Mr. Wyckoff, and it is already attracting much attention. It consists of two standard simple engines of 150 horse-power each; two 150 horse-power tandem compound engines, and one 200 horse-power cross compound engine. These engines are connected with Brush dynamos. The business of the Ball & Wood Company in Chicago will be conducted in its own name, with Mr. W. B. Pierson and Mr. Thomas C. Perkins as associate managers; Mr. Pierson having in his special charge the business connected with the large vertical engine this company is now bringing out, while Mr. Perkins will give his attention to engines of the horizontal type.

The Ball Engine Company, Erie, Pa., have made some unusually large shipments for this time of year, and report that they are crowded with orders. The following are some of their recent shipment:

L. M. Rumsey Mfg. Co., St. Louis, Mo., two 35 h. p. engines; Midvale Steel Co., Nicetown, Pa., one 130 h. p. engine; General Electric Co., Tucson, Arizona, one 130 h. p. engine; Lakewood Casino Co., Lakewood, N. J., one 50 h. p. steam plant; Calumet Street Railway Co., Chicago, Ill., four 300 h. p. cross compounds; Wheeling Street Railway Co., Wheeling, W. Va., three 250 h. p. cross compounds; Western Light and Power Co., Chicago, Ill., one 300 h. p. engine; Risdon Iron Works, San Francisco, Cal., three 150 h. p. tandem engines; Cienfuegos, Cuba, one 60 h. p. engine; Nantasket Steam Boat Co., Boston, Mass., three 25 h. p. and one 35 h. p. engine; Griggsville Electric Co., Griggsville, Ill., one 50 h. p. steam plant; Frank Jones' building, Cincinnati, O., one 35 h. p. engine; Hahane & Co., Newark, N. J., one 35 h. p. engine; Hammond Electric Railway Co., Hammond, Ind., one 150 h. p. steam plant; Logansport Electric Light Co., Logansport, Ind., one 130 h. p. engine; Combination Mining and Milling Co., Philipsburg, Mont., two 35 h. p. engines; Doylestown Electric Light Co., Doylestown, Pa., one 100 h. p. engine; Macon and Indian Springs Railway Co., Macon, Ga., one 150 h. p. steam plant; Dayton Mfg. Co., Dayton, O., one 100 h. p. engine; Cooley & Vater, Duluth, Minn., one 80 h. p. engine; Seabury & Johnson, East Orange, N. J., one 25 h. p. engine; Produce Exchange, New York city, one 25 h. p. engine; Edison Electrical Illuminating Co., Mt. Carmel, Pa., one 100 h. p. engine.

Reducing Friction by Means of Pure Flake Graphite.

For several months past an advertisement has appeared in the leading mechanical papers offering to send, free of charge, a pamphlet describing the nature and peculiarities of graphite, with scientific opinions as to its value as a lubricant, and experiences of practical engineers and machinists.

The result is there are hundreds, if not thousands, of wide-awake and progressive people who have a far better idea to-day as to the value of pure flake graphite for reducing friction in working parts of engines and machinery, and for lessening wear and tear and breakage in joints, gaskets, bolts, etc. Graphite is commonly known as black lead, but there is a wide difference in the material, as well as in its preparation for lubricating purposes, and a great deal of the stuff offered is worse than useless. It is for this reason that every one who has any use for a lubricant, and especially one that is possessed of such peculiar properties, should avail himself of an opportunity to see a sample and learn of its many uses. Such an opportunity is presented by the Joseph Dixon Crucible Company, Jersey City, N. J., who now not only offer to send their valuable pamphlet, but will also send sample of Dixon's pure Ticonderoga flake graphite free of charge.

American Street Railway Association.

The executive committee of the American Street Railway Association announces that the Milwaukee Industrial Exposition Building has been secured for the exhibition of supplies and manufactures of every nature used in the street railway business, in connection with the twelfth annual meeting of the Association, to be held in the city of Milwaukee, Wis., commencing the third Wednesday in October, 1893, and lasting three days. The building has been engaged for two entire weeks, beginning October 9 and ending October 23; thereby giving ample time for the setting up and removal of the largest and heaviest exhibits.

The hall for the meeting is also in the same building on the second floor, and delegates will be enabled to examine the exhibits with much greater satisfaction than heretofore, on account of the nearness of the meeting hall to the exhibits.

An advantage which will be appreciated by those desiring power will be found in the 150 horse-power engine on the premises. The only additional charge therefor will be that which the cost of furnishing the same will amount to, *pro rata*, among the exhibitors using power.

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BATTERY SUPPLIES?

We Can Quote You Bed-Rock on

Carbons, Zincs, Coppers, Jars, Sal-Ammoniac, Blue-stone, etc.

WRITE US FOR PRICES.

Law Battery Company,

85 JOHN STREET, NEW YORK.

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CANDELABRA

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INCANDESCENT LAMPS.

For information and prices covering Special, Candelabra and Miniature Incandescent Lamps, address the

EDISON DECORATIVE AND MINIATURE LAMP DEPARTMENT,

HARRISON, N. J.

ALUMINUM!

THE COWLES ELECTRIC SMELTING & ALUMINUM COMPANY,

Lockport, - New York,

Offer Pure Aluminum in Ingots, Slabs, Sheet, Wire and Castings at lowest market rates.

Aluminum Bronze, Aluminum Brass, Silver Bronze, Silicon Bronze and Manganese Bronze.

ENGINE CASTINGS

from one-eighth to six horse power Horizontal & Marine.

8, 16 & 60 LIGHT DYNAMO CASTINGS.

Simple Sewing Machine and Fan Motor Castings with instructions for building complete machines.

Send Stamp for Catalogue.

PALMER BROS., Electrical Supplies, Mianus, Conn.

Established 1847. Purely Mutual.

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The PENN LIFE Company,

— OF —

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WHY?

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Surplus, - - 2,465,689.13

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EZRA DE FOREST, Gen'l Agent,

181 BROADWAY, NEW YORK.

AUCTION SALE

The Wightman Electric Manufacturing Co.'s EFFECTS,

At the Factory, Washington Ave.,

SCRANTON, PA.,

At 10 A. M., on Tuesday, April 25th,

AND FOLLOWING DAYS.

PATENT RIGHTS,

Railway Motors and Controllers,

Shop Supplies, Line Supplies,

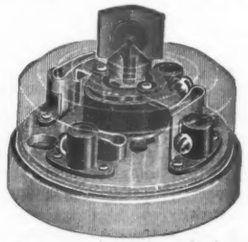
Magnet Wire, Cables.

WRITE FOR CATALOGUE TO

R. E. DUNSTON, Assignee,

Box 505, SCRANTON, PA.

HART SWITCHES



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The Hart & Hegeman Mfg. Co.,

HARTFORD, CONN.

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Instruments and Batteries of the Very Highest Grade.

Precision and Constancy, Quality and Finish the Best in the World.

Catalogue of Standard Test Instruments furnished upon application.

THE E. S. GREELEY & CO.,

5 AND 7 DEY ST., NEW YORK.

ROYCE & MAREAN,

DEALERS IN

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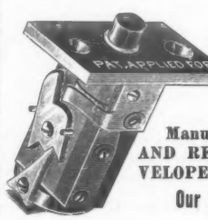

THE NEW YORK

Electrical and Development Co.

251 William Street, N. Y.

Manufacturers of ELECTRICAL GOODS. EXPERIMENTAL AND REPAIR WORK. INVENTIONS AND NOVELTIES DEVELOPED. PATENTS OBTAINED.

Our Automatic Door Light Switch illustrated in this Issue.